6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 80

[EPA-HQ-OAR-2021-0845; FRL-9075-03-OAR]

RIN 2060-AV55

Renewable Fuel Standard Program: Canola Oil Pathways to Renewable Diesel, Jet Fuel, Naphtha, Liquefied Petroleum Gas and Heating Oil

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: In this proposed rule, the Environmental Protection Agency (EPA) is providing an opportunity for comment on a proposed analysis of the lifecycle greenhouse gas (GHG) emissions associated with certain biofuels that are produced from canola/rapeseed oil. This assessment considers diesel, jet fuel, heating oil, naphtha, and liquefied petroleum gas (LPG) produced from canola/rapeseed oil via a hydrotreating process, and proposes to find that these pathways would meet the lifecycle GHG emissions reduction threshold of 50 percent required for advanced biofuels and biomass-based diesel under the Renewable Fuel Standard (RFS) program. Based on these analyses, EPA is proposing to approve these fuel pathways, making them eligible to generate Renewable Identification Numbers (RINs), provided they satisfy the other definitional and RIN generation criteria for renewable fuel specified in the RFS regulations.

DATES: *Comments*. Comments must be received on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

Public hearing. EPA will not hold a public hearing on this matter unless a request is received by the person identified in the **FOR FURTHER INFORMATION CONTACT** section of this preamble by **[INSERT DATE 15 DAYS AFTER DATE OF**

PUBLICATION IN THE FEDERAL REGISTER]. If EPA receives such a request, we will publish information related to the timing and location of the hearing and a new deadline for submission of public comments.

ADDRESSES: You may send comments, identified by Docket ID No. EPA-HQ-OAR-2021-0845, by any of the following methods:

- Federal eRulemaking Portal: *https://www.regulations.gov* (our preferred method). Follow the online instructions for submitting comments.
- Email: *a-and-r-Docket@epa.gov*. Include Docket ID No. EPA-HQ-OAR-2021-0845 in the subject line of the message.
- Mail: U.S. Environmental Protection Agency, EPA Docket Center, OAR, Docket EPA-HQ-OAR-2021-0845, Mail Code 28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460.
- Hand Delivery or Courier (by scheduled appointment only): EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue, NW, Washington, DC 20004. The Docket Center's hours of operations are 8:30 a.m. – 4:30 p.m., Monday – Friday (except Federal Holidays).

Instructions: All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to *https://www.regulations.gov*, including any personal information provided. For the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit *http://www.epa.gov/dockets/commenting-epa-dockets*.

Out of an abundance of caution for members of the public and our staff, the EPA Docket Center and Reading Room are closed to the public, with limited exceptions, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via *https://www.regulations.gov* or email, as there may be a delay in processing mail and faxes. Hand deliveries and couriers may be received by scheduled appointment only. For further information on EPA Docket Center services and the current status, please visit us online at *https://www.epa.gov/dockets*.

EPA continues to monitor information carefully and continuously from the Centers for Disease Control and Prevention (CDC), local area health departments, and our Federal partners so that we can respond rapidly as conditions change regarding COVID-19.

FOR FURTHER INFORMATION CONTACT: Christopher Ramig, Office of Air and Radiation, Office of Transportation and Air Quality, Mail Code: 6401A, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460; telephone number: 202-564-1372; email address: *ramig.christopher@epa.gov*.

SUPPLEMENTARY INFORMATION:

Does this action apply to me?

Entities potentially affected by this proposed rule are those involved with the production, distribution, and sale of transportation fuels, including gasoline and diesel fuel or renewable fuels such as ethanol, biodiesel, heating oil, renewable diesel, naphtha and liquified petroleum gas. Potentially regulated categories include:

Category	NAICS[1] Code	Examples of Potentially Affected Entities
Industry	111120	Oilseed (except Soybean) Farming
Industry	324110	Petroleum refineries (including importers)
Industry	325193	Ethyl alcohol manufacturing
Industry	325199	Other basic organic chemical manufacturing
Industry	424690	Chemical and allied products merchant wholesalers
Industry	424710	Petroleum Bulk Stations and Terminals
Industry	424720	Petroleum and Petroleum Products Merchant Wholesalers
Industry	454310	Other fuel dealers

[1] North American Industry Classification System (NAICS).

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated or otherwise affected by this action. This table lists the types of entities that EPA is now aware could potentially be affected by this action. Other types of entities not listed in the table could also be affected. To determine whether your entity is regulated by this action, you should carefully examine the applicability criteria in the referenced regulations. If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

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I. Introduction

Section 211(o) of the Clean Air Act (CAA) establishes the Renewable Fuel Standard (RFS) program, under which EPA sets annual percentage standards specifying the total amount of renewable fuel, as well as three subcategories of renewable fuel, that must be used to reduce or replace fossil fuel present in transportation fuel, heating oil, or jet fuel. Non-exempt renewable fuels must achieve at least a 20-percent reduction in lifecycle greenhouse gas (GHG) emissions as compared to a 2005 petroleum baseline. Advanced biofuel and biomass-based diesel must achieve at least a 50 percent reduction, and cellulosic biofuel must achieve at least a 60 percent reduction.[1]

In addition to meeting the applicable lifecycle GHG reduction requirements, RINs may only be generated if the fuel meets the definitional and other criteria for renewable fuel (e.g., produced from renewable biomass as defined in the regulations and used to reduce or replace the quantity of fossil fuel present in transportation fuel, heating oil, or jet fuel) in CAA 211(o) and the RFS regulations at 40 CFR part 80, subpart M.

Only fuels produced using pathways that EPA has approved as meeting all applicable requirements are eligible to generate RINs. There are three critical components of fuel pathways under the RFS program: (1) fuel type; (2) feedstock; and (3) production process. Each approved pathway is associated with a specific "D code" corresponding to whether the fuel meets the requirements for renewable fuel, advanced fuel, cellulosic fuel, or biomass-based diesel.[2] Since the formation of the RFS program, EPA has periodically promulgated rules to add new pathways to the regulations.[3] In addition, EPA has approved facility-specific pathways through the petition process in 40 CFR 80.1416.

EPA's lifecycle analyses are used to assess the overall GHG impacts of a fuel throughout each stage of its production and use. The results of these analyses, considering uncertainty and the weight of available evidence, are used to determine whether a fuel meets the necessary GHG reductions required under the CAA. Lifecycle analysis includes an assessment of emissions related to the full fuel lifecycle, including feedstock production, feedstock transportation, fuel production, fuel transportation and distribution, and tailpipe emissions. Per the CAA definition of lifecycle GHG emissions,[4]

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[1] *See generally* 42 U.S.C. 7545(o)(1).

[2] For additional information see: *https://www.epa.gov/renewable-fuel-standard-program/fuel-pathways-under-renewable-fuel-standard*.

[3] See, e.g., 83 FR 37735 (August 2, 2018) approving grain sorghum oil pathways and 78 FR 41703 (July 11, 2013) approving giant reed and Napier grass pathways.

[4] 42 U.S.C. 7545(o)(1)(H).

EPA's lifecycle analyses also include an assessment of significant indirect emissions, such as those from land use changes and agricultural sector impacts.

EPA conducted lifecycle GHG analyses for several combinations of biofuel feedstocks, production processes, and fuels and promulgated several fuel pathways as part of its March 26, 2010 RFS final rule (75 FR 14670) (the "March 2010 RFS2 rule"). In the preamble to that final rule, EPA indicated that it intended to add fuel pathways to the regulations via further notice-and-comment rulemakings. EPA subsequently completed a proposed assessment for canola oil biodiesel; this proposed assessment was published in the *Federal Register* for notice and comment on July 26, 2010 (75 FR 43522). This proposed assessment evaluated the GHG emissions associated with biodiesel produced from canola oil through a transesterification process. On September 28, 2010, EPA published a rule finalizing our determination that canola oil biodiesel meets the lifecycle GHG emissions reduction threshold of 50 percent required by the CAA, and added row G to table 1 to 40 CFR 80.1426, making canola oil biodiesel produced through a transesterification process eligible for biomass-based diesel (D-code 4) RINs (75 FR 59622) (September 2010 Canola Oil rule). This final rule did not include determinations for renewable diesel, jet fuel, naphtha, LPG, or heating oil produced from canola oil via a hydrotreating process.[5] In the 2013 Pathways I final rule (78 FR 14190, March 5, 2013) ("2013 Pathways I rule"), EPA added "rapeseed" to the existing pathway in row G for renewable fuel made from canola oil because "we had not intended the supplemental determination to cover just those varieties or sources of rapeseed that are identified as canola" (78 FR 14214). In that same rule, for clarity EPA also added "heating oil" to the rows in Table 1 that already included renewable diesel or biodiesel (78 FR 14201). As in the 2013 Pathways I rule, in this action we are similarly proposing

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[5] Hydrotreating, the process used to produce the vast majority of renewable diesel, consists of catalytic reactions in the presence of hydrogen. This process produces a "drop-in" fuel with properties virtually identical to petroleum diesel and distinct from biodiesel.

to add new pathways to table 1 for biofuels produced from "Canola/Rapeseed oil" but for simplicity we refer to both canola and rapeseed as "canola."

In 2020, the United States Canola Association (USCA) submitted a petition to EPA requesting an evaluation of the GHG emissions associated with renewable diesel, jet fuel, naphtha, LPG and heating oil produced from canola oil via a hydrotreating process, and a determination of the renewable fuel categories, if any, for which such biofuels may be eligible.[6] This preamble describes EPA's analysis of the lifecycle GHG emissions associated with these fuel pathways and provides a brief overview of its results.[7]

As described in Section II.C.12 of this preamble, we estimate that the lifecycle GHG emissions associated with the production of renewable diesel via a hydrotreating process are approximately 63 to 69 percent less than the applicable diesel baseline. We estimate that the naphtha and LPG co-produced with the renewable diesel has similar reductions of 64 to 69 percent and 63 to 69 percent compared to baseline GHG emissions, respectively. We estimate that jet fuel produced from canola oil through a hydrotreating process configured to maximize jet fuel output has lifecycle GHG emissions approximately 59 to 67 percent lower than baseline emissions. These ranges of GHG emissions estimates are based on differences in hydrotreating process configurations. Section II.C.9 of this preamble discusses these estimates and our consideration of uncertainty in the analysis.

Based on these estimates, we propose to find that these biofuels meet the 50 percent GHG reduction threshold required for advanced biofuel and biomass-based diesel. In this action, based on our analysis of available data and other input, EPA is proposing to add to table 1 of 40 CFR 80.1426 pathways for the production of renewable

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[6] U.S. Canola Association. (2020). Petition for Pathways for Renewable Diesel from Canola Oil as "Advanced Biofuel" Under the Renewable Fuel Standard Program.

[7] The full set of modeling results, post-processing spreadsheets and other technical documents describing this analysis are available in the docket for this action.

diesel, jet fuel, naphtha, LPG and heating oil produced from canola oil via a hydrotreating process. Specifically, we propose to add “Canola oil” to the Feedstock column in rows G, H, and I of table 1 to 40 CFR 80.1426. If finalized, these fuel pathways would be eligible for either biomass-based diesel (D-code 4) or advanced biofuel (D-code 5) RINs, depending on the fuel type and whether they are produced through a hydrotreating process that co-processes renewable biomass with petroleum. EPA requests public comment on these proposed pathway approvals.

EPA is also seeking comment on its proposal to add these fuel pathways to rows G, H, and I of table 1 to 40 CFR 80.1426. We note that in addition to approving generally-applicable pathways by adding them to table 1, EPA has also approved fuel pathways on a facility-specific basis in cases where the evaluation involved a straightforward application of prior modeling and analysis established through a notice and comment process. Consistent with this practice, EPA may also consider the analysis in this proposed rule and any comments it receives in evaluating facility-specific pathway petitions submitted pursuant to 40 CFR 80.1416 that propose using canola oil as a biofuel feedstock or hydrotreating as a production process.

II. Analysis of GHG Emissions Associated with Production of Biofuels from Canola Oil

A. Overview of Canola Oil

Canola oil is a vegetable oil that contains low concentrations of erucic acid (less than 2 percent), originally bred from cultivars of the Brassica and Sinapis genera.[8] In addition to use as a renewable fuel feedstock, canola oil is a common vegetable oil for food use. In many instances, canola oil is used synonymously with rapeseed oil, or is considered a varietal of it. We propose definitions of canola/rapeseed oil to be included in 40 CFR 80.1401. We request comment on this definition.

[8] See 21 CFR 184.1555 Rapeseed oil.

In September 2010, EPA evaluated a pathway for biodiesel produced from canola oil using a transesterification process to generate biomass-based diesel (D-code 4) RINs.[9] For that analysis, EPA performed lifecycle analysis using the methodology first described in the March 2010 RFS2 rule.[10] This methodology included the Forest and Agricultural Sector Optimization Model with Greenhouse Gases model (hereafter referred to as "FASOM") and the FAPRI-CARD model (Food and Agricultural Policy Research Institute international model; hereafter referred to as "FAPRI") developed at the Center for Agriculture and Rural Development at Iowa State University. These frameworks were used to estimate upstream GHG emissions associated with the production and transport of the canola oil feedstock.[11] These upstream emissions were evaluated in concert with a transesterification biodiesel production process using natural gas and electricity for process energy and glycerin as a co-product. Based on that analysis, EPA determined that canola oil biodiesel produced via transesterification meets the 50 percent GHG reduction threshold and added this fuel pathway to row G in table 1 to 40 CFR 80.1426, making this fuel eligible for biomass-based diesel (D-code 4) RINs. The September 2010 Canola Oil rule did not address pathways for renewable diesel, naphtha, LPG, jet fuel or heating oil produced from canola oil through a hydrotreating process.

In addition to the lifecycle GHG analysis, another factor EPA has analyzed in pathway determinations is the invasiveness properties of the feedstock and the appropriateness of requiring associated risk management measures. EPA began evaluating invasiveness concerns in the context of fuel pathway evaluation under the RFS program in the July 11, 2013 rule approving renewable fuel pathways for giant reed (*Arundo Donax*) and Napier grass (*Pennisetum Purpureum*) after receiving comments

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[9] 75 FR 59622 (September 28, 2010).
[10] For documentation of this methodology, see Docket Item No. EPA-HQ-OAR-2005-0161-3173.
[11] For further discussion of the scientific reasoning behind the use of these two specific models of this methodology, see Chapter 2 of the Final Regulatory Impact Analysis associated with the March 2010 RFS2 rule (EPA-420-R-10-006).

that these feedstocks present a risk of invasiveness.[12] Commenters stated that EPA should conduct an invasiveness species analysis, citing requirements of Executive Order (E.O.) 13112.[13] E.O. 13112, signed in February 1999, defines "invasive species" as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." In the July 2013 rule (78 FR 41703), we established requirements that producers of renewable fuel using giant reed or napier grass include a Risk Mitigation Plan (RMP) demonstrating measures taken to prevent the spread of these species, or demonstrate that an RMP is not needed because the species do not pose a significant likelihood of spread beyond the planted area. We are not proposing any risk management measures related to potential invasiveness of canola in this rule. Canola is an established feedstock with 89 million acres planted in over 30 countries in 2020.[14] We do not believe canola is an invasive species as defined in E.O. 13112, and we do not believe the approval of additional canola oil-based fuels would have implications for invasiveness. We request comment on this decision and the appropriateness of risk mitigation practices.

B. Petition Overview

The USCA submitted a petition in March 2020, pursuant to the petition process described at 40 CFR 80.1416, requesting EPA's evaluation of the lifecycle GHG emissions associated with producing renewable diesel, jet fuel, naphtha, LPG and heating oil from canola oil feedstock through a hydrotreating process. The petition requested that EPA evaluate these pathways using the same lifecycle analysis modeling approach used to evaluate canola-oil based biodiesel in the September 2010 Canola Oil Rule (75 FR 59622). However, USCA stated in their petition that, in our 2010 analysis of canola oil-

[12] 78 FR 41703 (July 11, 2013)
[13] 64 FR 6183 (February 3, 1999)
[14] United States Department of Agriculture, Foreign Agricultural Service. PSD Only Query tool. *https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery*. Data queried November 5, 2021.

based biodiesel, we overestimated the lifecycle GHG emissions associated with canola oil production in four categories: domestic land use change, domestic crop inputs, international land use change and international crop inputs. USCA supported their statements by comparing data sources underlying parts of our 2010 assessment of canola oil with more recent data. Specifically, the petition referenced more recent data on canola production, yields, trade, and oil extraction. Based on these comparisons, the USCA petition requested that we adjust our 2010 canola oil estimates without conducting new agricultural sector modeling.

The USCA petition requests that we simply adjust the results of our previously completed agricultural sector modeling based on new information. We believe such adjustments would be inappropriate because they would create inconsistencies between the agricultural sector modeling and the results. For example, it would be inappropriate to reduce planted area of canola based on new yield data and simply assume that the rest of the agricultural model results would remain unchanged. Thus, while we are not adjusting or otherwise reopening our 2010 canola oil-based biodiesel analysis or estimates, we do believe that the USCA petition highlights appropriate and significant areas where the data and information considered in the 2010 canola modeling should be updated for purposes of evaluating new fuel pathways that use canola oil feedstock. The petition includes detailed information showing that more recent data on canola oil production and trade patterns differed significantly from the data considered in the 2010 analysis. Based on these significant differences, and since we have not previously published lifecycle GHG emissions estimates for canola oil-based fuels produced through a hydrotreating process, we believe it is important to consider the more recent data highlighted in the USCA petition in a new lifecycle GHG analysis for these fuel pathways. This analysis uses the same modeling frameworks and methodology as we have used previously to evaluate agricultural feedstocks but includes updated data inputs as discussed later in this proposal.[15]

C. Analysis of Lifecycle GHG Emissions

1. Overview of Lifecycle Analysis Methodology

For this proposed rule, we evaluated the lifecycle GHG emissions of producing renewable diesel and other biofuels from canola oil. In this section, we describe our methodology for conducting this evaluation, the assumptions and scenarios evaluated using this methodology, and the results of our analysis. We used the same biofuel lifecycle analysis methodology and modeling framework developed for the March 2010 RFS2 rule and that was subsequently used for the September 2010 Canola Oil Rule.[16] The components of this methodology are described further later in this proposal, but generally involve the use of agricultural modeling to estimate emissions from land use change, crop production, livestock, and rice methane, as well as application of coefficients and assumptions from the Greenhouse Gases, Regulated Emissions, and Energy use in Technologies (GREET) model[17] and other sources to evaluate emissions associated with feedstock and fuel transport, processing, and use. This methodology was developed to estimate "lifecycle greenhouse gas emissions" as defined at section 211(o)(1)(H) of the Clean Air Act. It was used for the March 2010 RFS2 rule after an extensive peer review and public comment process.

In general, this methodology involves using two agricultural sector models, FASOM and the FAPRI-CARD model, to estimate U.S. and non-U.S. GHG emissions impacts respectively. In this methodology, we model and evaluate a hypothetical canola oil demand shock scenario to estimate changes in agricultural production and land use

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[15] For documentation of the LCA frameworks and methodology, see Docket Item No. EPA-HQ-OAR-2005-0161-3173.

[16] For information about our 2010 methodology and analysis see Section 2 of the regulatory impact analysis (RIA) for the March 2010 RFS2 rule and the associated lifecycle results (Docket Item No. EPA-HQ-OAR-2005-0161-3173).

[17] See documentation and description available from Argonne National Lab at *https://greet.es.anl.gov*.

and associated GHG emissions associated with the biofuel pathway under consideration. In this demand shock scenario, U.S. domestic consumption of a specific biofuel pathway is assumed to increase by some amount relative to the volume of U.S. domestic consumption in a reference scenario.

Following the lifecycle GHG analysis methodology developed for the March 2010 RFS2 rule, the modeling scenarios used in this analysis are designed to isolate the GHG impacts associated with the biofuel pathway being considered. They are not meant to project or forecast future market conditions, or to otherwise predict what will happen in the future if a given biofuel pathway is approved. Some of our assumptions, which are necessary to construct a scenario which appropriately isolates the impacts of a single fuel pathway, intentionally simplify what we would expect to occur in the real world. For example, in these scenarios, we hold U.S. consumption of all biofuels constant throughout the entire modeled period, except for the biofuel being evaluated. In reality, an increase in domestic consumption of one biofuel product would be expected to have some impact on consumption of other biofuel products. However, allowing for such market-balancing behavior would confound our ability to estimate the GHG impacts of one biofuel in isolation. Therefore, such simplifying assumptions are necessary for the purposes of our analysis. For these same reasons, it would be inappropriate to characterize the scenario results presented later in this proposal as a projection or forecast; these results should be interpreted as hypothetical scenarios.

This methodology also includes estimating GHG emissions associated with fuel production, distribution and use based on data from GREET and other sources. All of these GHG emissions estimates are added together and divided by the change in the amount of biofuel produced in the scenarios evaluated to estimate the lifecycle GHG emissions associated with fuel produced through the evaluated pathway, in terms of carbon dioxide-equivalent emissions per megajoule (MJ) of fuel produced. We are not reopening this overall lifecycle analysis methodology and modeling framework in this proposed rule; thus, any comments on the overall methodology and modeling framework are outside the scope of this rulemaking action.

Although we are using the same overall methodology and modeling framework as developed for the March 2010 RFS2 rule, we have updated the data inputs into this analysis in the following areas: (1) canola/rapeseed oil production, crushing, yields and trade based on historical data from USDA and other sources, (2) GHG emissions factors and transportation and distribution assumptions based on the latest version of the GREET model,[18] (3) the most recent global warming potentials from the Intergovernmental Panel on Climate Change (IPCC), (4) international crop production energy inputs based on historical FAO data, and (5) hydrotreating process assumptions based on literature review and information submitted through new pathway petitions. We request comment on these data input updates. As discussed in Section II.C.9 of this preamble, we also request comment on our use of the energy allocation method to account for co-products from the hydrotreating process, given that prior RFS rules used a displacement approach for some of these co-products. The rest of this section describes the updated data inputs used in our analysis and the scenarios modeled.

The lifecycle analysis for the March 2010 RFS2 rule relied to a relatively large extent on data and GHG emissions factors from the GREET model developed and maintained by Argonne National Laboratory. Version 1.8b of GREET was the most recent version available at the time of the March 2010 RFS2 rule.[19] For the analysis for this proposed rule, we have updated GHG emissions factors based on more recent data in GREET-2020. Some of the emissions factors have not changed substantially, while others have. For example, the carbon dioxide-equivalent emissions factor for natural gas

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[18] Argonne National Laboratory. (2021). Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) Model. https://greet.es.anl.gov/.

[19] As noted previously, we are not reopening the 2010 lifecycle GHG analysis for canola oil biodiesel.

consumed in the U.S. in medium-size industrial boiler increased by only 1% from GREET 1.8b to GREET-2020. Whereas, the emissions factor for U.S. average electricity has decreased by 41% reflecting significant changes to the U.S. grid.[20]

The latest version of GREET was released in October 2021. While the analysis for this proposed rule was almost entirely complete using data and emissions factors from GREET-2020 prior to the release of GREET-2021, we do consider the updated hydrotreating input-output data from GREET-2021 in this proposed rule. A brief review shows that the other relevant changes to emissions factors from GREET-2020 to GREET-2021 are relatively small – for example, in the latest version of GREET the GHG emissions factors per energy unit for average natural gas did not change, the emissions factor for gaseous hydrogen increased by one percent, and U.S. average grid electricity decreased by two percent. We intend to update these data to GREET-2021 for the final rule, but we do not expect these updates to change our estimates enough to affect our overall finding that the pathways evaluated satisfy the statutory 50 percent GHG reduction threshold for qualification as biomass-based diesel or advanced biofuel.

Another update is that the analysis for the March 2010 RFS2 rule used 100-year global warming potential (GWP) values from the IPCC Second Assessment Report. The analysis for this proposed rule uses 100-year GWP values from the most recent IPCC Fifth Assessment Report.[21] Based on these updates, the GWP for methane increased from 21 to 30, and the GWP for nitrous oxide decreased from 310 to 265.

Our analysis for this proposed rule considers updated data based on information submitted as part of the USCA petition. Global canola acreage has increased over the last

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[20] Both the natural gas and electricity emissions factor comparisons are weighted with the same 100-year GWP values from the IPCC Fifth Assessment Report.

[21] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

decade, from 83 million acres globally in 2010 to 89 million acres in 2020.[22] U.S. canola acreage increased over this time from 1.43 million acres in 2010 to 1.80 million acres in 2020, representing 1.7 percent and 2 percent of global totals respectively. Yields have increased over the same period in several producing regions. Average U.S. yields grew from 1,713 pounds per acre in 2010 to 1,927 pounds per acre in 2020 (12.5 percent increase) while yields improved more substantially in Canada and China over the same period (25 percent and 18 percent increases respectively). Global production of canola oil increased 24 percent between 2010 and 2020 to meet growing demand. This increase in demand was led by China. China's consumption of canola oil grew from 13 billion pounds in 2010 to 18 billion pounds in 2020. The U.S. canola oil consumption grew by 1.9 billion pounds over this timeframe, from 3.7 billion pounds to 5.6 billion pounds, representing a 54 percent increase.[23]

Specifically, for the purpose of this rulemaking we have updated our FASOM and FAPRI input assumptions to include more recent USDA historical data on global canola oil production, yields and trade.[24] Updates were made consistently between the two frameworks, using common data sources and assumption values where applicable (i.e., where both models require the same input assumption). These assumption updates are described in more detail in Sections II.C.2 and 3 later in this proposal. We have also updated the data source for estimating GHG emissions associated with farming energy use for canola oil and other crop production outside of the U.S. For more details, see Section II.C.5 of this preamble. We also consider new data on canola crushing from the USCA petition, feedstock and fuel transport from GREET-2020 and hydrotreating from

[22] In most of the world, canola is referred to as "rapeseed". For consistency, we use "canola" throughout to refer to both canola and rapeseed.
[23] United States Department of Agriculture, Foreign Agricultural Service. PSD Only Query tool. *https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery*. Last accessed March 16, 2022.
[24] These are taken from the USDA PSD data cited above and from the USDA National Agricultural Statistical Service QuickStats database (USDA NASS QuickStats). *https://quickstats.nass.usda.gov*. Last accessed March 16, 2022.

GREET-2021, as well as data from review of the literature and information provided through RFS new pathway petitions. All these updates taken together decrease our estimates of the lifecycle GHG emission associated with using canola oil as a biofuel feedstock compared to compared to our analysis for the September 2010 Canola Oil Rule. EPA previously determined that biodiesel produced from canola oil via transesterification meets the 50 percent threshold to generate D4 RINs. EPA is not revisiting, revising, or requesting comment on canola oil-based biodiesel or any other existing pathways. Given that most of the updates for this proposed rule pertain specifically to canola oil, we note that it would be inappropriate to draw any conclusions about the lifecycle GHG emissions associated with biofuel pathways that use feedstocks other than canola oil from our estimates for this proposed rule. EPA is therefore not requesting comment on pathways using any other feedstock besides canola oil.

EPA conducted two modeling scenarios in both FASOM and FAPRI for this analysis.[25] The difference in GHG emissions between these two scenarios represents our estimate of the emissions from land use change, agricultural input, livestock, and rice methane associated with using canola oil as a biofuel feedstock (our emissions estimates are described in Table II.C.8-1). First, we ran an updated Control Case that reflected the updated assumptions for global canola oil production, yields, and trade.[26] In this Control Case, we assumed no canola oil-based biofuels were consumed in the U.S. over the period of analysis (2012-2052 in FASOM, 2012-2022 in FAPRI), consistent with our Control Case assumptions for previous analyses. Second, we conducted a shock scenario that assumed a 1.53 billion pound increase in canola oil production for use as feedstock to produce approximately 200 million gallons of canola oil-based renewable diesel, jet fuel, naphtha, LPG and heating oil for U.S. consumption of in 2022 (hereafter the "Canola

[25] Complete sets of results for these FASOM and FAPRI modeling scenarios are available on the docket.
[26] A memorandum describing these updates and referencing their sources is available on the docket.

Case"), which was assumed to ramp up linearly from 2012 to 2022 (see Table II.C.1-1).[27] According to USDA historical data, annual U.S. consumption of canola oil ranged from about 5.3 to 6.4 billion pounds over the period between 2015 and 2020.[28] In addition, global canola/rapeseed seed annual exports ranged from approximately 32 to 38 billion pounds between 2015 and 2020 and canola/rapeseed oil exports ranged from about 9 to 13 billion pounds over the same period; this suggests substantial quantities of additional feedstock may be available for import to the U.S. market.[29] Based on data from the EPA Moderated Transaction System (EMTS) , the U.S. produced approximately 160 million gallons of canola oil biodiesel in 2020, and another 123 million gallons of biodiesel produced from a mix of feedstocks were imported from Canada, which likely included a portion from canola oil. Thus, the volume of hydrotreated canola oil-based fuels in the modeled shock is a similar order of magnitude as the volume of biodiesel currently produced from canola oil. Finally, according to EPA's administrative data from the RFS program, about 1.5 billion RINs were generated for renewable diesel in 2019, equivalent to about 900 million gallons.[30] Based on these data, we believe the magnitude of the assumed shock in the Canola Case is reasonable and appropriate.

All other assumptions were held constant between the Control Case and the Canola Case. The structure of this shock was designed to be consistent with the shock methodology approach used for EPA's previous lifecycle GHG analyses of agricultural feedstocks under the RFS program.

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[27] Depending on the source of hydrotreating process data used, the size of the shock ranges from 187 million gallons of hydrotreated renewable fuel (based on GREET-2021) to 220 million gallons (based on data in petitions submitted pursuant to 40 CFR 80.1416 claimed as confidential business information).
[28] See for reference the USDA Oil Crop Yearbook at *https://www.ers.usda.gov/data-products/oil-crops-yearbook*. Last accessed March 16, 2022.
[29] United States Department of Agriculture, Foreign Agricultural Service. PSD Only Query tool. *https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery*. Data queried March 16, 2022
[30] See public data from the RFS program at *https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rins-generated-transactions.*

Table II.C.1-1 – Canola Oil Shock Scenario[31]

Year	Assumed Increase in USA Canola Oil Consumption for Biodiesel Production (Billion Pounds of Canola Oil)
2012	0.25
2017	0.9
2022 through 2057	1.53

2. FASOM Analysis

EPA used FASOM to estimate the GHG emissions from domestic land use change, farm inputs, livestock, and rice methane associated with using canola oil as a biofuel feedstock. This is the same methodology EPA previously used to estimate these GHG emissions sources for soybean oil-based biodiesel and other agricultural feedstocks.[32] EPA updated several aspects of its analysis of the domestic U.S. emissions associated with production of fuels from canola oil for this analysis, building on the version of FASOM used for the analysis of the GHG emissions attributable to the production and transport of sugar beets for use as a biofuel feedstock.[33] In this section, we first review the updates made to model inputs and other assumptions for this analysis. Following this, we present a summary of the FASOM modeling results.[34]

i. Modifications to Model Inputs and Assumptions

For this analysis, EPA updated FASOM assumptions related to market conditions for canola seed, canola meal, and canola oil. This included assumptions about historical

[31] Note that, consistent with our existing methodology, the volume shock is implemented slightly differently in FASOM and FAPRI. For FASOM, which operates in 5-year time steps, the values in this table fully represent the assumptions used to implement the shock. For FAPRI, which operates in annual time steps, interim year assumption values are interpolated linearly to create a smooth "ramp-up" path for the volume shock. Further description of this methodology can be found in Chapter 2 of the Final Regulatory Impact Analysis associated with the March 2010 RFS2 rule (EPA-420-R-10-006).
[32] See Docket Item No. EPA-HQ-OAR-2005-0161-3173 for details on the version of FASOM used to analyze emissions associated with soybean oil-based biodiesel. See Docket No. EPA-HQ-OAR-2010-0133 for details on the version of FASOM used to analyze emissions associated with canola oil-based biodiesel. See Docket No. EPA-HQ-OAR-2016-0771 for details on the version of FASOM used to analyze emissions associated with sugar beet-based ethanol.
[33] See Docket No. EPA-HQ-OAR-2016-0771 for details on the version of FASOM used to analyze emissions associated with sugar beets.
[34] Further information about our assumptions and the modeling results are available in the docket for this action.

U.S. prices; quantities of seed, meal, and oil consumed; planted area; seed yields; and trade quantities and elasticities. Updated assumptions for prices, planted area, and seed yields were primarily taken from USDA National Agricultural Statistical Service (NASS) historical data sets.[35] In some cases, these NASS data were supplemented with additional data taken from the USDA Oil Crop Yearbook and the USCA. These updates replaced previous assumptions in FASOM for the years 2011 through 2020. In the case of canola seed yields, FASOM's baseline trend of future yields was also reprojected using the updated NASS data.[36]

EPA also updated FASOM to reflect differences in historical pricing between U.S. domestically-produced canola seed, oil, and meal and imported canola seed, oil, and meal. Imported canola seed and oil from Canada are important components of the U.S. market, generally representing well over 90 percent of the canola products consumed in the U.S. in any given year.[37] Reflective of this market dynamic, historical data show that Canadian producers exporting to the U.S. were systematically paid less for their canola oil than domestic U.S. producers.[38] In previous modeling analyses, FASOM assumed a single price for both domestic and imported canola oil. This led to a consumption mix that included a greater percentage share of domestically-produced canola products, especially oil, than actually occurred historically. In the updated modeling conducted for this assessment, EPA differentiated the prices at which domestic and imported canola seed and oil could be supplied to the U.S. market and then recalibrated canola trade elasticities to better reproduce historical market shares of domestically-produced canola

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[35] See USDA NASS QuickStats. *https://quickstats.nass.usda.gov*. Last accessed March 16, 2022.

[36] Further information regarding these updated assumptions is detailed in the memorandum, "Memo on FASOM Assumptions," available in the docket for this action.

[37] For detailed data on US imports of canola seed, meal, and oil by trade partner, see the UN Comtrade database at *https://comtrade.un.org/data*

[38] For U.S. price data see USDA ERS – Oil Crops Yearbook. Canola Seed and Canola Seed Products. *https://www.ers.usda.gov/data-products/oil-crops-yearbook*. Last accessed March 16, 2022. For Canadian price data, see Canola Council of Canada. Canadian canola export statistics. *https://www.canolacouncil.org/markets-stats/exports/#export-values.* Last accessed March 16, 2022.

products and Canadian imported canola products more accurately in FASOM.[39] EPA requests comment on these updates to our modeling assumptions. We are not seeking comment on the overall lifecycle analysis methodology and modeling framework used to conduct this analysis, which were subject to notice and comment in the March 2010 RFS2 rule.[40]

ii. Summary of Results

This section describes the differences in FASOM results between modeled outcomes from the Control Case and the Canola Case (described in Table II.C.1-1). Unless otherwise stated, the data presented in this section are the calculated differences between the Control Case and the Canola Case (i.e., the model output value for a variable reported in the Canola Case minus the output value for that same variable reported in the Control Case). In this summary, we first describe the ways in which FASOM estimates the canola oil feedstock used to supply the biofuel shock would be sourced. We then describe the market adjustments in canola oil prices, supply, demand, and trade which FASOM estimates would be necessary to facilitate this sourcing of canola oil for fuel use. Following this, we describe the shifts in production of other crops, cropland use, and land use which FASOM estimates would occur as a result of the sourcing of canola oil for fuel use.

The total quantity of canola oil required to produce the assumed marginal volume shock in the Canola Case was assumed to be approximately 1.53 billion pounds. To supply this quantity of canola oil to the biofuel production sector, FASOM made several market adjustments. Of the total 1.53 billion pounds required, FASOM estimated approximately 1.28 billion pounds would be supplied by increasing the total U.S. supply

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[39] Further information regarding the assumptions made to conduct the FASOM modeling in support of this analysis is available in the memorandum, “Memo on FASOM Assumptions,” available in the docket for this action.

[40] EPA (2010). Renewable fuel standard program (RFS2) regulatory impact analysis. Washington, DC, US Environmental Protection Agency Office of Transportation Air Quality. EPA-420-R-10-006.

of canola oil via a combination of increased imports and increased domestic production. These 1.28 billion pounds would represent an approximately 28 percent increase in total domestic supplies of canola oil. FASOM estimates canola oil imports would increase by about 1.18 billion pounds. Domestic crushing of canola seed into meal and oil would produce about 0.1 billion pounds of additional canola oil. Domestic demand for non-fuel uses of canola oil, inclusive of all food uses (e.g., cooking, baking, salad dressings) and non-fuel industrial uses (e.g., industrial lubricants, cleaning products, cosmetics), would decrease by approximately 0.25 billion pounds to provide the remaining canola oil required to meet the 1.53-billion-pound shock. These shares of biofuel feedstock are summarized in Table II.C.2.ii-1.

Table II.C.2.ii-1 – Sources of Canola Oil for Biofuel Feedstock in the Canola Case

Feedstock Source	**Quantity (Billion Pounds)**	**Percent of Total Volume Shock**
Increased Imports	1.18	77%
Reduced Domestic Demand for Non-Fuel Uses	0.25	16%
Increased Domestic Production	0.1	7%
Total Volume Shock	1.53	100%

As stated earlier in this proposal, most of the additional supply of biofuel feedstock is expected to come from imported canola oil.[41] FASOM estimates these imports would increase by approximately 40 percent in 2022 in response to the shock. Because modeled non-fuel uses of canola oil are not drawn on as significantly to provide feedstock for this shock, FASOM does not estimate there would be a significant need to backfill the domestic U.S. vegetable oil market. Domestic consumption of other vegetable oils therefore does not change significantly in these results. Following this, FASOM estimates virtually no changes in imports of other vegetable oils in these results. Increased demand for canola oil in response to the volume shock is estimated to cause the

[41] FASOM is a U.S.-only model and does not disaggregate imports and exports to and from the U.S. by country of origin.

average price of canola oil for all uses to increase by approximately 24 percent in the Canola Case. This price increase would put downward pressure on other uses of canola oil, and non-biofuel domestic demand for canola oil is estimated to decrease by approximately 5.6 percent. FASOM estimates these higher prices would also induce domestic U.S. production of canola oil to increase by about 7 percent. Table II.C.2.ii-2 reports changes in supply, demand, and prices for canola oil in the Canola Case relative to the Control case. Changes for other modeled vegetable oils, specifically soybean oil and corn oil, are estimated to be in the range of 0.03 percent or less and are not presented here, though these results are available in the docket.[42]

Table II.C.2.ii-2 – Canola Oil Market Responses in 2022 (in percentage changes)

	Percent Change from Control Case
Total Domestic Demand	-5.6%
U.S. Imports	38.9%
U.S. Production	7.0%
U.S. Price	24.1%

FASOM estimates the increase in canola oil production would result in an increase in canola seed crushing of approximately 253.5 million pounds, an increase in domestic canola oil production of about 7 percent compared to the Control Case. Most of this increase in canola crushing would be supplied through increased imports of whole canola seed. Of the total increase in canola seed supply to the crushing market, 87 percent is estimated to come from increased imports and 13 percent is estimated to come from increased domestic U.S. production. As observed above, the U.S. canola product markets are historically import-dependent. Based on this, we believe the response in FASOM is consistent with historical market patterns. However, FASOM estimates the increase in domestic crushing would also induce a response from domestic canola seed demands.

[42] Further information is available in the documents, “Canola_FASOM results” and “FASOM HTML (full results)” available in the docket for this action.

FASOM estimates direct domestic uses of canola seed other than crushing would decrease by approximately 16 percent. Domestic canola seed production also responds, and FASOM estimates domestic production would increase by approximately 1 percent. These impacts are summarized in Table II.C.2.ii-3. This increase in U.S. canola seed production would be facilitated in part by a modeled expansion in canola harvested crop area of about 17,600 acres, or about 1.2 percent, in the U.S. in 2022 (see Table II.C.2.ii-4).

Table II.C.2.ii-3 – Canola Seed Market Responses in 2022 (in Million Pounds)

	Change from Control Case
Total Domestic Demand	-5.8 (-16%)
U.S. Imports	216.5 (20%)
U.S. Production	31.3 (1%)
U.S. Canola Seed Crushing	253.5 (7%)

These shifts in canola supply, demand, and trade would also have implications for production and consumption of other crops. The modeled increase in canola crushing also produces an additional 156 million pounds of canola meal, all of which FASOM estimates would be supplied to the domestic livestock market. This influx of meal would primarily displace corn in livestock diets. Corn consumption in the domestic feed market is estimated to decrease by about 306 million pounds (about 0.08 percent). This same dynamic can be observed in the FASOM results for commodity trade. As international trade partners increase exports of canola oil to the U.S., these exporters crush additional canola seed. This creates additional supplies of meal for these canola-producing nations, reducing their demands for corn as well. As a result, corn exports from U.S. are estimated to decrease by about 271 million pounds (about 0.28 percent). On net, FASOM estimates that U.S. corn production would decline by about 589 million pounds and that corn harvested area would decline by about 49,100 acres, or about 0.06 percent (see Table II.C.2.ii-4).

Canola and wheat can be produced on the same type of land in high latitude agricultural systems like Canada and North Dakota, and many farmers rotate the two crops. In response to an increase in production of canola, farmers are likely to respond in one of two ways. One option is that total acres in wheat/canola rotation could increase. The other option is for canola to displace wheat area to some extent as farmers tilt rotations more heavily towards the former (e.g., canola-canola rotations rather than canola-wheat rotations). We observe these complex dynamics in the FASOM results for the Canola Case. To increase canola exports to the U.S. market, FASOM estimates the international market would decrease production of wheat, creating an opportunity for U.S. wheat producers to increase their exports. This impact is relatively marginal in comparison to the shock. However, FASOM estimates U.S. wheat exports would increase by about 174 million pounds, or about 0.18 percent. Domestic wheat production would increase by about 169 million pounds and the harvested area in wheat production (excluding wheat used for grazing) would expand by about 63,000 acres, or about 0.02 percent (see Table II.C.2.ii-4).

The modeling results also show some minor net shifts in other cropland as markets re-equilibrate in response to the shock, totaling about 28,100 harvested acres, or about 0.01 percent. Harvested crop area impacts are summarized in Table II.C.2.ii-4. The shock results in modeled net increase in total domestic harvested crop area of approximately 60,600 acres. This increase would require some shifting of land use from other uses to cropland; as discussed later in this section this land is shifted into cropland from pasture and cropland pasture on net.

Table II.C.2.ii-4 – Harvested Crop Area Responses in 2022 (in Thousand Acres)

	Change from Control
Canola	17.6 (1.2%)
Wheat	63 (0.02%)
Corn	-49.1 (-0.06%)
All Else	28.1 (0.01%)
Total	60.6 (0.02%)

Our FASOM results estimate these small shifts in agricultural production volumes would have some modest impact on agricultural prices. In our scenario, canola meal and wheat prices are estimated to decline as production increases, by 0.02 percent and 0.51 percent respectively, while corn prices would rise by 0.44 percent as production decreases. FASOM estimates the livestock market would respond to the increase in corn prices by consuming slightly less corn (0.08 percent compared to baseline consumption). This would be made up in part by a modeled increase in canola meal consumption. However, the modeled increase in corn prices is estimated to create some upward pressure on overall feed prices as well, raising the estimated cost of livestock production. On net in these results, beef slaughter is estimated to decrease by 0.04 percent in response to higher costs and chicken (broiler) slaughter would decrease by 0.05 percent.

Geographically, the modeled domestic response to the shock is concentrated in North Dakota. Canola production is estimated to increase in North Dakota by about 28.9 million pounds (about 1.4 percent) and canola crop area is estimated to expand by 16,300 acres (as discussed later in this section, this acreage comes from a mix of existing and new agricultural land). This accounts for about 92 percent of the total estimated increase in U.S. domestic canola production in the Canola Case. As North Dakota is the dominant producer of canola in the U.S., this modeled impact appears to be consistent with historical agricultural patterns. North Dakota is also a significant producer of wheat. As canola production is estimated to expand in North Dakota, FASOM estimated wheat production would shift to North Dakota region by about 218 million pounds, decreasing on net in all other regions by about 50 million pounds.

Canola is generally crushed near areas of cultivation and a majority of U.S. facilities that process canola seed are located in North Dakota.[43] Following this, as North Dakota canola production is estimated to expand to supply the canola shock, FASOM estimates the additional seed would be crushed into oil and meal in this region as well. This would expand regional supply of livestock feed and would decrease regional feed prices, relative to other regions of the U.S. FASOM estimates that this, in turn, would create incentives to shift livestock production to North Dakota and nearby states. Since livestock feed mixes require several different components, FASOM estimates this shift in livestock production towards North Dakota would also shift production of other feed crops (e.g., corn, soybeans, hay) into North Dakota. Production of these feed crops are estimated to increase by a total of 115,000 acres in 2022. The modeled changes in North Dakota crop area are summarized in Table II.C.2.ii-5. FASOM estimates net cropland in North Dakota would increase by 218,300 acres.[44]

Table II.C.2.ii-5 – Changes in North Dakota Crop Area in 2022 (in Thousand Acres)

	Change from Control Case
Canola	16.3 (1.39%)
Wheat	86.8 (1.42%)
All Else	115.2 (1.38%)
Total	218.3 (1.39%)

Within North Dakota, FASOM estimates that most this additional cropland (212,000 acres) would be taken from Conservation Reserve Program (CRP) land and a smaller amount (7,000 acres) would be taken from cropland pasture. However, as

[43] National Oilseed Processors Association, "NOPA Plant Locations", https://www.nopa.org/oilseed-processing/nopa-plant-locations/. Last accessed March 16, 2022.
[44] Note that FASOM does not track conversion of other land types to cropland by crop. This modeled expansion in North Dakota cropland is best understood as an increase in total cropland at the expense of other land uses rather than an expansion cropland for canola, wheat, or any other specific crop into previously uncropped area.

discussed later in this section, the nationwide net effect on land use from the shock would affect other land types as well.

As crop area expands in North Dakota in response to the shock and livestock production shifts to this region, FASOM estimates total crop area would decrease in the rest of the U.S. FASOM estimates this dynamic would primarily shift production from Iowa and Kansas to North Dakota, suggesting a relatively modest northwesterly shift overall. On net, national crop area is estimated to expand by 60,600 acres in 2022. The modeled state-level changes in total harvested crop area are summarized in Table II.C.2.ii-6.

Table II.C.2.ii-6 – Changes in Regional Harvested Crop Area in 2022 (in Thousand Acres)

	Change from Control Case
North Dakota	218.3 (1.4%)
Iowa	-82.7 (-0.3%)
Kansas	-60.5 (-0.5%)
All Other Regions	-14.5 (-0.01%)
Total	60.6 (0.02%)

As FASOM estimates cropland would expand in North Dakota, the majority, about 212,000 acres, is estimated to shift into cropland status from land that is placed in CRP in the Control Case. The remaining area shifting into cropland status is estimated to shift from cropland pasture. As modeled crop production shifts on the margin out of Iowa and Kansas, FASOM estimates CRP area would increase in these regions to compensate for the decrease in North Dakota CRP area; nationwide CRP area does not change on net in our results. FASOM estimates pasture area would decrease nationwide as greater availability of livestock feed would slightly reduce demand for grazing. In some regions, FASOM estimates this previously grazed pastureland would be forested instead, leading to a modeled increase in forestland. The changes in total regional crop area are summarized in Table II.C.2.ii-7.

Table II.C.2.ii-7 – Changes in National Land Area in 2022 (in Thousand Acres)

	Change from Control Case
Cropland[45]	61 (0.02%)
Cropland Pasture	-57 (-0.07%)
Pasture	-36 (-0.04%)
Forest	32 (0.01%)

3. FAPRI Analysis

Like the assessment of domestic impacts using the FASOM model described in Section II.C.2, EPA used FAPRI to estimate the GHG emissions associated with producing canola oil biofuel from international land use change and livestock. This is the same methodology EPA previously used to estimate these emissions sources for soybean oil-based biodiesel and other agricultural feedstocks (e.g., in the March 2010 RFS2 rule, but also in several subsequent pathway determinations). EPA updated several aspects of its analysis of the international GHG emissions associated with canola oil biofuel feedstock production this analysis, building on the FAPRI model used for EPA's analysis of the GHG emissions attributable to the production and transport of sugar beets for use as a biofuel feedstock.[46] In this section, we first review the updates made for this analysis. Following this, we present a summary of the FAPRI modeling results.[47]

i. Modifications to Model Inputs and Assumptions

For this analysis, EPA updated FAPRI assumptions related to market conditions for canola seed, canola meal, and canola oil. This included assumptions about historical U.S. consumption, planted area, seed yields, and trade quantities. Updated assumptions for prices, planted area, and seed yields were primarily taken from NASS historical data sets. In some cases, these NASS data were supplemented with additional data taken from

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[45] Note that cropland reported in national land area includes land that is planted but intentionally not harvested, e.g., crops grown for grazing. Land area totals will therefore differ slightly from the harvested crop area data discussed above.
[46] See 82 FR 34656, July 26, 2017 for details on the version of FAPRI used to analyze emissions associated with sugar beets.
[47] Further information about our assumptions and the modeling results are available in the document, "FAPRI Outputs," available in the docket for this action.

the USDA Oil Crop Yearbook and the USCA. In addition to updated canola yields in the U.S., USDA Foreign Agricultural Service (FAS) Production, Supply and Distribution (PSD) data[48] was used to update the FAPRI baseline trend of future yields in the EU, China, and Canada, regions where real-world yields had diverged most from previous FAPRI baseline assumptions.

Additionally, three elasticities were adjusted to better align the projected international canola market conditions from FAPRI with recent historical data. Notably, the previous FAPRI baseline did not reflect the emergence of Canada as an important producer and exporter of canola and canola oil. Changes were made to align production and trade patterns in Canada, China, and the European (EU) using historical data for the 2009/2010 – 2021/2022 model periods obtained from the USDA PSD database. The first adjustment made was to increase the crush demand elasticity of canola in Canada from 0.22 to 0.4 to reflect Canada's greater canola oil production and export relative to the previous FAPRI baseline. Increasing this elasticity estimate results in more canola crushed in Canada if the price increases. If Canada produces more canola oil, all else equal, Canadian exports would increase because of this assumption of increased elasticity. Second, we reduced the Chinese canola crush elasticity from 0.26 to 0.18 to reduce the higher-than-observed Chinese canola oil production and export in the FAPRI baseline relative to historical data.[49] As a results of this change, Chinese canola crushing is less responsive to a change in the price of canola. If China crushes less canola, all else equal, Chinese canola exports would decrease. Last, the own-price demand elasticity for rapeseed oil in China was reduced from -0.25 to -0.15. This adjustment was made to further reduce the strong Chinese canola oil export position estimated by the previous

[48] USDA, Foreign Agricultural Service. PSD Only Query tool. *https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery*. Last accessed March 16, 2022.
[49] USDA, Foreign Agricultural Service. PSD Only Query tool. *https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery*. Last accessed March 16, 2022.

FAPRI baseline. Making the Chinese own-price elasticity of demand for canola oil more inelastic has the effect of making Chinese domestic consumption of canola oil less responsive ("stickier") to changes in price.

EPA also updated the representation of canola and canola oil production in the India region to further align FAPRI with historical data. Indian trade of canola and canola oil are fixed in the FAPRI model at historical levels given very low levels of trade activity of these commodities historically.[50] Similarly, the FAPRI modeling for this proposed rule does not allow for any changes in Indian canola or canola oil production in response to increased demand for canola oil-based biofuels. In 2020, global exports of canola oil were 14 billion pounds. Of this total, India exported 11 million pounds, or 0.08 percent. India does not export any canola seed.[51] Therefore, we believe these adjustments are reasonable based on consideration of recent data and generally consistent with observed agricultural trade patterns.[52]

ii. Summary of Results

To meet the 200 million gallons per year shock of canola oil biofuel, FAPRI estimates that the U.S. will import 100 percent of the feedstock required to meet the canola oil biodiesel shock in 2022. The FAPRI modeling results estimate that 48 percent of this canola oil feedstock would come from new production, with the remainder coming from shifts in other end uses. FAPRI estimates that global agricultural markets would provide the U.S. this feedstock in several ways. EU and Canadian net exports are estimated to increase by 750 and 278 million pounds, equivalent to 49 percent and 18 percent of the increase in U.S. net imports respectively. China's net imports of canola oil

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[50] USDA, Foreign Agricultural Service. Oilseeds and Products Annual. March 31, 2021. Available at *https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Oilseeds%20and%20Products%20Annual_New%20Delhi_India_04-01-2021*. Last accessed March 16, 2022.
[51] USDA, Foreign Agricultural Service. PSD Only Query tool. *https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery*. Last accessed March 16, 2022.
[52] Further information regarding these updated assumptions is detailed in the memorandum, "TITLE," available in the docket for this action.

would be reduced by 362 million pounds relative to the baseline, equivalent to 23 percent of the increase in U.S. net imports. The remaining increase in U.S. net imports are modeled to be supplied through increased net exports from other countries.

FAPRI estimates that all of the canola oil to satisfy the shock would be supplied through increased net imports to the U.S. Since we use the FASOM results to estimate U.S. GHG emissions and the FAPRI results for non-U.S. GHG emissions, the effect of this discrepancy likely increases our GHG emissions estimates relative to a case where both models are perfectly aligned on the share of canola oil supplied through increased U.S. canola production. This is because we include the GHG emissions in the U.S. associated with producing 7 percent of the needed canola oil as estimated with FASOM and also the GHG emissions associated with producing 100 percent of the needed canola oil outside of the U.S. as estimated with FAPRI. For this reason, our estimates may be viewed as conservative (i.e., resulting in greater GHG emissions).[53] In the March 2010 RFS2 rule, we considered comments that questioned the benefit of using both FASOM and FAPRI given the inconsistencies in the results and decided that the benefits of FASOM's more detailed representation of the U.S. agricultural and forestry sectors and associated GHG emissions outweighed the inevitable inconsistencies associated with using both models (75 FR 14768). We took steps in the March 2010 RFS2 rule and in the analysis for this proposed rule to reconcile the two model results to the extent possible by applying the same set of scenarios and key input assumptions in both models.[54] Overall, we believe the 7 percent difference in sourcing of U.S. canola oil supplies provides a

[53] The purpose of lifecycle assessment for RFS pathway assessments is not to precisely estimate lifecycle GHG emissions associated with particular biofuels, but instead to determine whether or not the fuels satisfy specified lifecycle GHG emissions thresholds to qualify as one or more of the four types of renewable fuel specified in the statute (March 26, 2010, 75 FR 14785). Where there are a range of possible outcomes and the fuel satisfies the GHG reduction requirements when "conservative" assumptions are used, then a more precise quantification of the matter is not required for purposes of a pathway determination.
[54] As explained earlier in this section, we are not reopening the overall modeling framework or approach established in 2010 in this rulemaking.

reasonably aligned and conservative estimate of the lifecycle GHG emissions associated with scenario modeled.

FAPRI results show that canola seed production would increase by 1,743 million pounds and canola oil production by 733 million pounds globally in 2022 in response to the shock. Table II.C.3.ii-1 illustrates the source and amounts of additional canola and canola oil production in 2022.

Table II.C.3.ii-1 – FAPRI 2022 Canola and Canola Oil Production Response by Region in 2022 Relative to Control Case

	Canola		Canola Oil
	Acreage (thousand acres)	Production (million pounds)	Production (million pounds)
Australia	60	70	4
Canada	207	453	263
China	285	536	173
EU	223	629	234
All Other	43	56	60
Total	819	1,743	733

While FAPRI estimates that the EU will produce the most additional canola (629 million pounds), Canada is estimated to produce the most additional canola oil (263 million pounds). This is because, in addition to increasing of domestic production of canola seed, Canada is also estimated to reduce net exports of canola seed by 146 million pounds, and to crush that additional amount of seed.

The amount and composition of land use change associated with these canola expansions varies by region. While FAPRI estimates that China would experience the largest expansion of canola acres in 2022 (285,000 acres), there would be a relatively small amount of net cropland expansion (12,000 acres) as there would also be reductions in wheat and corn acres. Similarly, is the results show a net reduction of 12,000 acres of cropland in Canada as wheat, corn, and barley production would be reduced due to a change in relative prices stemming from the canola oil shock. In the EU, there would be a net expansion of cropland of 103,000 acres, and in Brazil there would be an increase of

58,000 acres of cropland, led by corn and soybean expansion. FAPRI also estimates a reduction of 232,000 acres of pasture in Brazil, as the infusion of canola meal as a byproduct of additional canola crushing alleviates demand for grazing. In total, FAPRI estimates that cropland would expand by 372,000 acres outside of the U.S. in response to the shock.

Table II.C.3.ii-2 – Non-U.S. Changes in Agricultural Land by Region in 2022 Relative to Control Case (in Thousand Acres)

	Change in area harvested	Change in pasture acres[55]	Total change in acres
EU	103	NR	103
Brazil	58	- 232	- 175
Rest of Non-USA	211	NR	211
Total Non-USA	372	- 232	140

4. Domestic Agricultural and Land Use Change GHG Emissions

We used the results from the FASOM analysis to estimate domestic agricultural GHG emissions following the methodology developed for the March 2010 RFS2 rule. As noted above, for this proposed rule we used emissions factors from GREET-2020 for energy inputs and feedstock and co-product transportation. Domestic agricultural GHG emissions include GHG emissions associated with changes in crop and livestock production. Overall, we estimate that increasing the consumption of hydrotreated canola oil biofuels in the U.S. would result in a net reduction in domestic agricultural GHG emissions of 40 grams of carbon dioxide-equivalent emissions (gCO_2e) per pound of canola oil used as feedstock relative to scenario absent this hydrotreated canola oil biofuel production ("gCO_2e per pound of canola oil").[56]

The 40 gCO_2e per pound of canola oil reduction in domestic agricultural GHG emissions has a handful of components. As discussed in Section II.C.2.ii, the FASOM

[55] NR stands for "not reported". Pasture acreage is only reported for Brazil in the FAPRI model

[56] Consistent with the methodology developed for the March 2010 RFS2 rule, for purposes of this lifecycle GHG analysis we use 100-year global warming potential (GWP) weighed emissions of carbon dioxide, methane, and nitrous oxide to calculated CO_2e emissions.

results estimate a small shift away from corn production towards canola and wheat. This leads to a small net decline in farm input usage, resulting in a small estimated reduction in GHG emissions of about 1 gCO_2e per pound of canola oil. The estimated net decrease in beef and chicken slaughter discussed in Section II.C.2.ii of this preamble is associated with a GHG emissions decrease of about 40 gCO_2e per pound of canola oil. There is also a small increase in rice production in the U.S. (about 0.02 percent), leading to an increase of about 1 gCO_2e per pound of canola oil from rice methane. As discussed above, our FASOM modeling results estimate that almost all the canola oil feedstock would be sourced outside of the U.S., and the relatively small effects on the domestic agricultural sector reflect this result.

Domestic land use change GHG emissions are reported separately from domestic agricultural emissions. Based on the FASOM modeling discussed in Section IV.C.2 of this preamble, we estimate a net reduction in domestic land use change emissions of 77 gCO_2e per pound of canola oil. It is based on the same methodology used for the March 2010 RFS rule whereby the land use change GHG emissions estimates from FASOM are considered over a 30-year period and then annualized (i.e., divided by 30 years). For a detailed description of how FASOM estimates land use change GHG emissions see Section 2.4.4.1 ("Evaluation of Domestic Land Conversion GHG Emissions Impacts") of the Regulatory Impact Analysis for the March 2010 RFS2 rule.[57] FASOM estimates land conversions and associated changes in the biomass and soil carbon stocks. Given the many interactions simulated in FASOM it is difficult to summarize why domestic land use change GHG emissions are estimated to decline as a result of the modeled scenario. However, the reduction in emissions is consistent with the overall land use changes summarized in Table II.C.2.ii-7. Cropland area increases by 61 thousand acres, which is

[57] EPA (2010). Renewable fuel standard program (RFS2) regulatory impact analysis. Washington, DC, US Environmental Protection Agency Office of Transportation Air Quality. EPA-420-R-10-006.

usually associated with increased land use change GHG emissions, but this is offset by an increase of 32 thousand acres of forest area, which is associated with a net reduction in GHG emissions.

5. International Agricultural and Land Use Change GHG Emissions

We used the results from the FAPRI analysis to estimate international (i.e., non-U.S.) agricultural and land use change GHG emissions following the methodology developed for the March 2010 RFS2 rule, except that, as described in this section, we updated our estimates of the GHG emissions associated with changes in international on-farm energy use. International agricultural sector GHG emissions are associated with estimated changes in crop and livestock production outside of the U.S. International land use change emissions are primarily changes in biomass and soil carbon associated with land use changes, but they also include non-CO_2 emissions some cases (e.g., when land is cleared with fire). Overall, we estimate a small reduction of 5 gCO2e per pound of canola oil associated with changes in international agriculture.

The small reduction in GHG emission associated with international agriculture is the result of counterbalancing effects. We estimate that the modeled canola oil shock increases GHG emissions associated with international farm inputs (e.g., fertilizer, pesticide, energy) by 70 gCO_2e per pound of canola oil. The canola shock is associated with changes in livestock production that reduce GHG emissions by 72 gCO_2e per pound of canola oil. Changes in rice production results in a small decreased of 3 gCO2e per pound of canola oil. These changes largely balance each other out and result in an overall reduction in international agricultural emissions, not including land use change, of 5 gCO_2e per pound of canola oil. These estimates are summarized along with the domestic estimates in Table II.C.8-1. The rest of this section describes our updates to estimate GHG emissions associated with changes in international on-farm energy use and then discusses the estimated international land use change GHG emissions.

Based on our assessment of the information provided in the USCA petition, we updated the data sources used to estimate the changes in energy inputs and associated GHG emissions corresponding with changes in international crop production as estimated with the FAPRI model. The USCA petition stated, "For countries except Canada, EPA used International Energy Agency (IEA) data for energy use for the forest and agriculture sector and then divided that by the crop area. The energy use, based on this data, is overstated because it includes forestry energy use." We confirmed that the IEA data used in our 2010 analysis to estimate changes in non-U.S. on-farm energy use included forestry energy use along with crop production energy use, and these data were then rolled into our estimates of energy use per acre of crop production for each region. We also found that the IEA data are aggregated so that forestry could not be excluded.

We reviewed other available sources on energy use and found that the Food and Agriculture Organization of the United Nations (FAO) reports emissions data on the amount of energy used within the farm gate to operate machinery.[58] The FAO also reports GHG emissions from aquaculture and fishing, but we exclude these data in order to exclusively estimate emissions from on-farm energy use energy use. The FAO data are available annually from 1970-2019 for over 200 countries. FAO reports emissions of carbon dioxide, methane, and nitrous oxide for seven different energy products (i.e., coal, electricity, fuel oil, gas-diesel oil, LPG, motor gasoline, and natural gas including LNG). After reviewing the FAO farm energy use GHG emissions data, we believe they are an improvement compared to the IEA data used previously for the purposes of this analysis because they are more recent and exclude forestry energy use. For these reasons, we have

[58] FAO, 2021. FAOSTAT Energy Use domain, FAO, Rome, Italy. Available at: *http://www.fao.org/faostat/en/#data/GN*. Last accessed March 16, 2022. FAOSTAT Analytical Briefs can be found at: *http://www.fao.org/food-agriculture-statistics/data-release/environment/en*. Last accessed March 16, 2022.

updated our assumptions to use the FAO data for this analysis of canola oil renewable diesel.

The FAO data report energy GHG emissions within the farm gate, including off-farm GHG emissions associated with generating electricity. Although the FAO estimates include off-farm GHG emissions associated with electricity generation, they exclude GHG emissions associated with producing the energy products and feedstocks for this electricity generation. For example, they exclude GHG emissions associated with natural gas production and distribution. In prior analyses, we adjusted the IEA estimates to include these upstream GHG emissions based on estimates from the GREET Model (version 1.8b) on the ratio of total lifecycle emissions to fuel use (or generation for electricity) emissions for each production. For this analysis of canola oil, we used the same approach but updated these ratios based on data from GREET-2020.[59]

The rest of this section discusses the international land use change GHG estimates. We estimate international land use change GHG emissions of 316 gCO2e per pound of canola oil. We consider the uncertainty in the types of land converted and the emissions associated with those conversions and estimate a 95% confidence interval for international land use change emissions ranging from 131 to 529 gCO2e per pound of canola oil.

International land use change GHG emissions were estimated following the methodology developed for the March 2010 RFS2 rule. The FAPRI model estimates changes in harvested crop area by region as a result of the modeled canola oil biofuel scenarios. FAPRI also estimates changes in pasture area for five sub-regions of Brazil. For other regions, changes in pasture area are estimated based on FAPRI's estimated changes in livestock production and FAO data on stocking rates (i.e., grazing animals per

[59] For more information on these estimates see the memo to the docket titled, "Memo on Hydrotreated Canola Lifecycle GHG Calculation Workbooks."

acre of pasture). In regions where the sum of changes in cropland or pasture are non-zero, we estimate changes in the areas of other land types based on land use change patterns in each region as estimated with satellite data. The estimated land use changes are then converted to GHG emissions based on land use change emissions factors estimated from a number of data sources following IPCC guidelines. International land use changes are estimated over 30 years and then annualized (i.e., divided by 30 years). For details on this methodology see Section 2.4.4.2 ("International Land Conversion GHG Emissions Impacts") of the Regulatory Impact Analysis for the March 2010 RFS2 rule.

Following the approach developed for the March 2010 RFS2 rule, we consider the uncertainty in the international land use change GHG estimates to produce a 95% confidence interval. This uncertainty analysis considers two major components: 1) uncertainty in the classification of land transitions with satellite data to determine the types of land affected by changes in cropland and pasture area in each region, and 2) uncertainty in the emissions factors used to translate the land conversions to GHG emissions. For more information about our evaluation of the uncertainty in international land use change GHG emissions see Section 2.4.4.2.8 ("Uncertainty Assessment for International Land Conversion GHG Emissions Impacts") of the RIA for the March 2010 RFS2 rule.

We recognize that there are other uncertainties that could theoretically be estimated, for example uncertainties in the areas of cropland estimated by the FAPRI model. However, quantifying additional sources of uncertainty was not part of the modeling framework or methodology developed for the March 2010 RFS2 rule, and would require the development of new methodologies and modeling approaches. Running multiple scenarios with the FAPRI model in order to systematically quantify parameter uncertainty would take a very long time and be impractical for this rule. As discussed in Section III., we consider the weight of available evidence when proposing

RIN D-code eligibility for the evaluated pathways. In weighing the available evidence, we put the most weight on the quantified range of lifecycle GHG estimates but also recognize qualitatively that there are unquantified sources of uncertainty.

6. Feedstock Processing

After the canola seeds are harvested, they are transported to a crushing facility to separate the canola oil and meal. The most common process uses the solvent hexane. The canola seeds are first cleaned, heated, and flaked. The seeds are then cooked and screw-pressed to remove most of the oil. To remove the remaining oil, the meal is saturated with hexane solvent, which is removed and then recycled back into the process. The oil is further refined to remove free fatty acids and other impurities.

We estimate canola crushing GHG emissions following the methodology developed for the March 2010 RFS2 rule. We estimate the total GHG emissions associated with canola crushing with no allocation to the canola meal co-product that is primarily used as livestock feed. The effects of using canola meal as feed are considered in the FASOM and FAPRI modeling described above. In lifecycle analysis terminology, this would be described as a system expansion approach as opposed to allocating emissions to the meal.

The USCA petition included annual canola crushing input-output data from Canada that we used in our analysis. We believe these data are appropriate for our analysis because a large share of canola oil feedstock for the U.S. is likely to be sourced in Canada, and the Canadian extraction process is representative of extraction processes in other regions that are likely to crush canola to supply canola oil biofuel feedstock to the U.S. For example, data compiled by the United Nations International Civil Aviation Organization (ICAO) for canola crushing in Canada, Europe and the U.S. shows similar but smaller amounts of natural gas and electricity use per pound of canola oil extracted. [60] The USCA data reports average energy use of 1,310 Btu of per pound of canola oil extracted in Canada. For comparison the ICAO reports energy use of 790 to 1,220 Btu per pound of canola oil extracted. Based on this comparison, we believe that using the USCA data for canola crushing energy use is reasonable and somewhat conservative.

Based on the USCA crushing data, we assume approximately 40 percent yield of canola oil per seed on a mass basis, and that natural gas and electricity are used for heat and power. We estimated the GHG emissions associated with the natural gas based on GREET-2020 estimates for average North American natural gas production and use. For electricity, we used the GREET-2020 emissions factor for average Canadian electricity. GREET includes 2012 data for the Canadian grid mix, which we updated based on 2018 data from Natural Resources Canada.[61] Based on these assumptions, we estimate GHG emissions from canola oil extraction of 87 gCO2e per pound of canola oil.

Recognizing that canola may be crushed in other regions, we considered the effects of canola crushing in the U.S., Europe and China to determine if crushing in other regions would affect our proposed determination that hydrotreated canola oil meets the 50% GHG reduction threshold. To evaluate this question, we used the same crushing input-output data from the USCA petition and considered regional differences in grid average electricity GHG emissions factors and GHG emissions associated with additional canola oil shipping. Although the U.S. grid is more GHG intensive than the Canadian grid, the effect of crushing in the U.S. compared to Canada is less than one gram CO_2e per pound canola oil and we assume there would be no significant change in GHG

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[60] ICAO (2021). CORSIA Eligible Fuels - Lifecycle Assessment Methodology. CORSIA Supporting Document. March 2021. Version 3. Table 43. Page 65.

[61] Natural Resources Canada. Last updated October 6, 2020. "Electricity Facts." *https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-canada.html#:~:text=More%20than%20half%20of%20the,and%20petroleum%20(Figure%202).* Last Accessed March 16, 2022.

emissions associated with canola oil transport. The average European grid is less GHG intensive than the Canadian grid but the effect on crushing in Europe compared to Canada is also less than on gram CO_2e per pound of canola oil. If we consider canola oil shipping from Europe of 4,000 nautical miles (e.g., Rotterdam to Houston) via ocean tanker fueled with bunker fuel, that adds approximately 13 gCO_2e per pound of canola oil, equivalent to approximately a one percent increase in GHG emissions relative to the petroleum baseline. Crushing in China and shipping 5,500 nautical miles (e.g., Beijing to Los Angeles) would add approximately 18 gCO_2e per pound of canola oil, which is still equivalent to approximately a one percent increase in GHG emissions relative to the baseline. As an extremely conservative scenario, if we assume crushing in China with coal instead of natural gas for process energy and 5,500 nautical miles of shipping, this adds approximately 139 gCO_2e per pound of canola oil, or approximately 9% relative to the petroleum baseline. Even with these extremely conservative assumptions, renewable diesel and jet fuel still satisfy the 50% GHG reduction threshold when we use our mean estimate of international land use change GHG emissions (i.e., 55% to 61% reduction for renewable diesel and 51% to 59% reduction for renewable jet fuel). Overall, this shows that our proposed determinations are not sensitive to our assumption about where canola is crushed, and we believe that assuming canola crushing occurs in Canada is a reasonable approach for this analysis.

7. Feedstock Transport

There are three stages of feedstock transport considered in our lifecycle analysis. The transportation modes and distances for canola seed and oil in our analysis are from the GREET-2020 model. First canola seeds are assumed to be transported 10 miles from the farm field to a collection point by medium-duty truck. The model then assumes seeds are then transported 40 miles to the crushing facility by heavy duty truck. After crushing, the oil is transported 80 miles by tanker truck to a hydrotreating facility. The trucks in this transportation chain are assumed to consume diesel fuel and we estimated the associated GHG emissions based on the GREET-2020 emissions factor for conventional diesel. Overall, we estimate GHG emissions of 15 gCO2e per pound of canola oil for seed transport and 13 gCO2e per pound of canola oil for canola oil transport. As discussed in Section IV.C.7, importing canola oil from Europe or China would increase oil shipping emissions but not to a large enough extent to change our proposed determinations that biofuels produced from hydrotreated canola oil meet the 50 percent GHG reduction requirement .

8. Summary of Upstream GHG Emissions

Based on all of the modeled effects discussed above associated with producing canola oil feedstock including effects on domestic and international crop production, livestock production and land use, we can summarize the estimated lifecycle GHG emissions per pound of canola oil delivered to a hydrotreating production facility. These upstream GHG emissions (i.e., upstream of feedstock conversion to fuel) are summarized in Table II.C.8-1. A range of GHG emissions is presented based on our evaluation of the uncertainty associated with international land use change GHG emissions, as discussed in Section IV.C.5 of this preamble.

Table II.C.8-1 – Estimated Upstream GHG Emissions Associated with Producing Canola Oil Used for Biofuel Production (in grams of CO_2-equivalent per pound canola oil)

Emissions Category	**Estimate**		
Domestic Farm Inputs	-1		
Domestic Livestock	-40		
Domestic Rice Methane	1		
Domestic Land Use Change	-77		
International Farm Inputs	70		
International Livestock	-72		
International Rice Methane	-3		
Seed transport	15		
Crushing	87		
Oil Transport	13		
International Land Use Change Estimate	Mean	Low	High
International Land Use Change	316	131	529
Total	**305**	**118**	**517**

Note: The "Low" international land use change estimate represents the low-end of the 95% confidence interval and the "High" estimate represents the high-end of the 95% confidence interval.

9. Fuel Production

Canola oil is converted to renewable diesel, jet fuel, naphtha, and LPG through a hydrotreating process, also sometimes referred to as hydroprocessing. The renewable diesel may also be used as heating oil, although this is unlikely based on recent market conditions such as strong demand for renewable diesel to satisfy low carbon fuel standards in California, Oregon and Washington.[62] The process consists of catalytic reactions in the presence of hydrogen. The steps in a typical hydrotreating process often include a combination of hydrogenation, hydro-deoxygenation, decarboxylation and decarbonylation. The primary output of hydrotreating is renewable diesel, with estimates ranging from approximately 75 to 100 percent of the output based on the data sources discussed later in this proposal. Other outputs include jet fuel, naphtha, LPG, and

[62] U.S. Energy Information Administration. (2021). "U.S. renewable diesel capacity could increase due to announced and developing projects." July 29, 2021; U.S. Energy Information Administration. (2018). "Renewable diesel is increasingly used to meet California's Low Carbon Fuel Standard." November 13, 2021.

propane. Hydrotreating facilities can process a wide range of vegetable oil feedstocks without significant operational changes.

The hydrotreating process can be configured to maximize renewable jet fuel output instead of renewable diesel, but this requires additional hydrogen and other energy inputs. To maximize jet fuel output, the renewable diesel is subjected to additional refining, namely hydro-isomerization and hydrocracking. These processes involve the addition of more hydrogen to crack the longer carbon chain length diesel to shorter length jet fuel. Essentially, the diesel is cracked to produce jet fuel and naphtha. Overall, maximizing hydrotreating processes for jet fuel output results in higher production costs and GHG emissions per gallon relative to processes that are maximized for diesel output.[63] As described later in this proposal, these effects are considered in our analysis.

Several hydrotreating pathways have been evaluated and approved under the RFS program. In the March 2010 RFS2 rule, we approved multiple pathways for renewable diesel produced from hydrotreated vegetable oils and biogenic waste fats, oils, and greases (FOG) as meeting the 50 percent GHG reduction requirement to qualify as biomass-based diesel and advanced biofuel. In the 2013 Pathways I rule (78 FR 14190), we evaluated renewable diesel from camelina oil and reported the GHG emissions associated with the hydrotreating process used to convert the camelina oil to renewable diesel. That analysis relied on data published in Pearlson et al. (2013), a study that modeled the emissions and fuel production costs associated with of a commercial scale hydrotreating process.[64] We also used the Pearlson et al. (2013) data in our analysis of hydrotreating for the 2018 distillers sorghum oil rule (83 FR 37735).

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[63] Wang, W. C., Tao, L., Markham, J., Zhang, Y., Tan, E., Batan, L., Warner, E., & Biddy, M. (2016). Review of Biojet Fuel Conversion Technologies. Report prepared by National Renewable Energy Laboratory.

[64] Pearlson, M., et al. (2013). "A techno-economic review of hydroprocessed renewable esters and fatty acids for jet fuel production." Biofuels, Bioproducts and Biorefining 7(1): 89-96.

In addition to evaluating generally applicable hydrotreating pathways, we have approved several facility-specific pathways for hydrotreating facilities. For the facility-specific analyses, we relied on data from the individual facilities, submitted under claims of CBI on their energy use and fuel yields. In October 2013, we approved a facility-specific petition for renewable LPG and naphtha co-products produced from distillers' corn oil at Diamond Green Diesel's hydrotreating facility in Louisiana.[65] In 2017 and 2018, we also approved pathways for LPG and naphtha produced from distillers' corn oil and waste FOG at Renewable Energy Group's hydrotreating facility in Louisiana.[66] In July 2021, we approved a facility specific pathway for jointly filed petition from Koole and Neste for renewable diesel and jet fuel produced from waste FOG.[67] We have also received additional facility-specific petitions for hydrotreating processes that are currently under review. In total, we have received hydrotreating data, claimed as CBI, from five different facilities through the petition process for new RFS pathways at 40 CFR 80.1416.

We estimated hydrotreating GHG emissions based on 12 sources of vegetable oil hydrotreating input-output data. Eight of the modeled processes primarily produce renewable diesel with co-products, varying by process, of naphtha, LPG, and jet fuel. Four of the modeled processes are configured to maximize jet fuel output with co-products, varying by process, of renewable diesel, naphtha, and LPG.

The eight data sources for hydrotreating processes that primarily produce renewable diesel include Pearlson et al. (2013), GREET-2021, aggregated data provided

[65] EPA. (2013). "Diamond Green Diesel Request for Fuel Pathway Determination under the RFS Program." Office of Transportation and Air Quality. October 28, 2013. *https://www.epa.gov/renewable-fuel-standard-program/diamond-green-diesel-llc-approval.* Last Accessed March 16, 2022.
[66] EPA (2017). "Evaluation of Renewable Energy Group, Inc. Request for Fuel Pathway Determination under the RFS Program" April 13, 2017. *https://www.epa.gov/renewable-fuel-standard-program/reg-geismar-approval.* Last Accessed March 16, 2022. EPA (2018). "Renewable Energy Group, Inc. Fuel Pathway Determination under the RFS Program" February 23, 2018. *https://www.epa.gov/renewable-fuel-standard-program/reg-geismar-approval-0.* Last Accessed March 16, 2022.
[67] EPA. (2021). "Koole-Neste Fuel Pathway Determination under the RFS Program." Office of Transportation and Air Quality. July 12, 2021. *https://www.epa.gov/system/files/documents/2021-08/koole-neste-deter-ltr-2021-07-12.pdf.* Last Accessed March 16, 2022.

by the California Air Resources Board (CARB), and five facilities that submitted data under claims of CBI pursuant to the petition process. As mentioned above, Pearlson et al. (2013) is a peer-reviewed study that modeled a commercial scale hydrotreating process. The renewable diesel production data have been updated in the GREET-2021 model with operational data from 2018 and 2019 from a survey of domestic renewable diesel producers conducted by Argonne National Laboratory and the National Biodiesel Board.[68] The CARB provided data are the average inputs and outputs associated with the hydrotreating processes used to produce renewable diesel for use under the California Low Carbon Fuel Standard Program, as of June 2021. The data for five hydrotreating facilities submitted through new pathway petitions and claimed as CBI were submitted between 2018 and 2020.

The four data sources used to model hydrotreating processes configured to maximize jet fuel output are Pearlson et al. (2013), GREET-2021 and two from an analysis published by the International Civil Aviation Organization (ICAO) in 2021. The first data source is the "maximum jet fuel" scenario from Pearlson et al. (2013). The data in GREET-2021 for renewable jet fuel production through hydrotreating is unchanged from previous versions of GREET. We also evaluated two scenarios from ICAO (2021): one that is representative of U.S. hydrotreating and one that is representative of European hydrotreating.

To estimate the GHG emissions associated with these hydrotreating processes, we used energy allocation to account for the fuel coproducts from the hydrotreating process. We estimated the total GHG emissions from the hydrotreating process and allocated them to the renewable diesel, jet fuel, naphtha, LPG, and propane co-products on an energy basis. The propane is treated as a co-product in these calculations but is unlike the other

[68] Wang et al. 2021. "Summary of Expansions and Updates in GREET 2021." October 2021. ANL/ESD-21/16

co-products because we do not expect it to be exported from the facility. For data sources that reported propane as an output, we assume that this propane is used at the facility as process fuel, and that this propane use is reflected in the input data reducing the amount of purchased natural gas. As a result of this energy allocation approach, all the co-products are assigned equivalent emissions from the fuel production stage on a gCO_2e per MJ basis. To translate energy use into GHG emissions, we used emissions factors for natural gas, electricity, and hydrogen from the GREET-2020 model representing the GHG emissions associated with the supply of these energy inputs in the U.S.[69]

In previous GHG analyses of hydrotreating processes, we assumed that some of the co-products (propane and in some cases LPG and naphtha) would not be used as RIN-generating fuels, and we included GHG reductions associated with these renewable co-products displacing the use of equivalent conventional fuels.[70] In contrast, the analysis for this proposed rule does not include GHG reductions associated with hydrotreating co-products displacing other fuels. Instead, we use energy allocation for all the co-products. We are taking this approach for four reasons. One, the USCA petition requests RIN eligibility for all of the co-products except propane, so propane is the only co-product for which a displacement approach would be considered. Second, we believe that using energy allocation for all of the co-products, including propane, provides a reasonably conservative estimate (i.e., tends to result in higher GHG estimates). Third, using energy allocation for co-products the estimates do not depend on which co-products generate RINs, which is subject to change based on market and regulatory conditions. Fourth, we also note that the energy allocation approach results in GHG estimates that are more consistent across facilities compared to the displacement approach due to the variation in

[69] As discussed above, although we have evaluated the updated hydrotreating data from the GREET-2021 model, the rest of our analysis had already been conducted using emissions factors from the GREET-2020 model. We will update these emissions factors for the final rule, but we do not expect this to have a large enough impact on our estimates to affect the pathway approvals proposed in this rule.

[70] See for example the March 2013 Pathways I rule (78 FR 14190) and the August 2018 sorghum oil rule (83 FR 37735).

co-product outputs across facilities. As an illustrative example of how much this assumption influences the estimates, if we assumed the propane co-product displaces natural gas the fuel production emissions for renewable diesel would decrease by an average of 2.1 gCO_2e per MJ, and up to 5.9 gCO_2e per MJ, relative to the estimates in Table II.C.9-1 that are based on energy allocation for propane. For renewable jet fuel, the same displacement approach for propane co-product would reduce fuel production emissions by an average of 3 gCO2e per MJ, and up to 4.7 gCO2e per MJ, relative to the estimates in Table II.C.9-2 that are based on energy allocation for propane. We request comment on the use of energy allocation to evaluate co-products from hydrotreating processes.

Hydrogen is major energy input to hydrotreating processes. We used the GREET-2020 emissions factor representing hydrogen produced from natural gas through a stream methane reforming process at central plants. Central plants are large hydrogen production facilities that produce greater than 50,000 kilograms of hydrogen per day.[71] This is a conservative choice as GREET has lower GHG estimates for other sources of hydrogen. We believe this choice is reasonable and appropriate for this analysis as the proposed pathway would be available to renewable diesel plants irrespective of their hydrogen sources.

The estimated lifecycle GHG emissions associated with hydrotreating processes that primarily produce renewable diesel are summarized in Table II.C.9-1. As shown in the table, the highest and lowest estimates are based on data from two of the facility-specific petitions. The estimates based on data from Pearlson et al. (2013), GREET-2021 and CARB are within 1.2 gCO_2e/MJ of each other and between the estimates for individual facilities.

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[71] U.S. Department of Energy. "The Hydrogen Analysis (H2A) Project." *https://www.hydrogen.energy.gov/h2a_analysis.html.* Last accessed March 16, 2022.

Table II.C.9-1 – GHG Emissions Associated with Renewable Diesel Production via Hydrotreating (in grams of CO_2 equivalent per MJ)

Hydrotreating Data Source	Estimate
Pearlson et al. (2013)	10.8
GREET-2021	11.8
CARB (2021)	12.0
Facility 1	15.0
Facility 2	10.4
Facility 3	13.7
Facility 4	10.9
Facility 5	14.4
Range	10.4 – 15.0

The estimated lifecycle GHG emissions associated with hydrotreating processes configured to maximize jet fuel output are summarized in Table II.C.9-2. The estimate based on GREET-2021 is significantly greater than the other sources because it includes greater natural gas and hydrogen use per unit of jet fuel output.

Table II.C.9-2 – GHG Emissions Associated with Renewable Jet Fuel Production via Hydrotreating (in grams of CO_2 equivalent per MJ)

Hydrotreating Data Source	Estimate
Pearlson et al. (2013) Maximized Jet	12.9
ICAO (2021) EU Jet	14.7
ICAO (2021) U.S. Jet	12.7
GREET-2021 Jet	20.7
Range	12.7 – 20.7

Based on the analysis and data sources discussed above, we estimate the GHG emissions associated with the hydrotreating stage range from 10.4 to 15.0 gCO_2e/MJ for renewable diesel and 12.7 to 20.7 gCO_2e/MJ for jet fuel. As discussed in Section III, we consider the full range of hydrotreating GHG estimates in this proposal to approve these canola oil-based biofuel pathways.

10. Fuel Distribution

We estimated the GHG emissions associated with transporting the renewable diesel, jet fuel, naphtha, and LPG products to end users based on transportation and distribution data in GREET-2020. The renewable diesel and jet fuel are assumed to be transported by truck, rail, and barge. The naphtha and LPG are assumed to be transported primarily by pipeline and rail. The fuel distribution GHG estimates are 0.4 gCO_2e/MJ for renewable diesel and jet fuel and 0.6 gCO_2e/MJ for renewable naphtha and LPG.

11. Fuel Use

For this analysis, we applied non-CO_2 fuel use GHG emissions factors from GREET-2020.[72] For renewable diesel, we used the factors for renewable diesel used in a compression ignition direct injection vehicle. For renewable jet fuel, we used the factors for hydrotreated renewable jet fuel consumed in a single aisle passenger aircraft. For renewable naphtha, we used the factors for renewable gasoline consumed in a spark-ignition vehicle and for LPG we used factors for a dedicated LPG vehicle. The fuel use GHG estimates are 0.9 gCO_2e/MJ for renewable diesel, 0.1 gCO_2e/MJ for renewable jet fuel, and 0.5 gCO_2e/MJ for renewable naphtha and LPG.

12. Results of GHG Lifecycle Analysis

Table II.C.12-1 reports our estimates of the lifecycle GHG emissions associated with renewable diesel produced from canola oil through a hydrotreating process, and the corresponding percent reduction relative to the petroleum baseline. Three sets of estimates are presented for canola oil renewable diesel. The emissions categories are aggregated to simplify the presentation of the table. Domestic and international agricultural emissions include emissions associated with changes in crop and livestock production. Feedstock processing (i.e., canola seed crushing) and feedstock seed and oil transport emissions are reported together. Downstream and use includes emissions from

[72] Following the methodology developed for the March 2010 RFS2 rule after notice, public comment, and peer review, the carbon in the finished fuel derived from renewable biomass is treated as biologically derived carbon originating from the atmosphere. In the context of a full lifecycle analysis, the uptake of this carbon from the atmosphere by the renewable biomass and the CO_2 emissions from combusting it cancel each other out. Therefore, instead of presenting both the carbon uptake and tailpipe CO_2 emissions, we leave both out of the results. Note that our analysis also accounts for all significant indirect emissions, such as from land use changes, meaning we do not simply assume that biofuels are "carbon neutral."

fuel distribution and fuel use. Land use change emissions include emissions from domestic and international land use changes.

Our evaluation considers uncertainty in international land use change emissions based on the methodology used for the March 2010 RFS2 rule. The table includes a range of land use change estimates based on our analysis of this uncertainty. The first column includes results based on our average estimate of international land use change GHG emissions. We also report results for the low and high ends of our 95 percent confidence interval for international land use change emissions. Ranges for domestic agriculture, international agriculture, feedstock transport and crushing, and fuel production are based on estimated ranges in the yield of finished fuel (in MJ of fuel produced per pound of canola oil feedstock).

Table II.C.12-1 – Lifecycle GHG Emissions Associated with Renewable Diesel Produced from Canola Oil Through a Hydrotreating Process (in grams of CO_2 equivalent per MJ)

Emissions Category	2005 Diesel Baseline	Canola Oil Renewable Diesel		
Domestic Agriculture	18	-2.5 to -2.2		
International Agriculture		-0.33 to -0.28		
Feedstock Transport & Crushing		6.2 to 7.3		
Fuel Production		10.4 to 15.0		
Downstream & Use	75	1.3		
Land Use Change Estimate		Mean	Low	High
Land Use Change		13.0 to 15.2	3.0 to 3.5	24.6 to 28.7
Net Emissions	93	28.9 to 34	18.6 to 23.4	40.7 to 46.4
% GHG Reduction Relative to Baseline		63% to 69%	75% to 80%	50% to 56%

In many cases, when vegetable oils are hydrotreated to produce renewable diesel, there are co-product outputs of naphtha, LPG, and jet fuel. The GHG estimates for these co-product fuels differ slightly from the renewable diesel estimates presented in the table above based on differences in how they are transported to end users and end use emissions. The results for naphtha and LPG, based on the mean international land use change estimates, are summarized in Table II.C.12-2.

Table II.C.12-2 – Lifecycle GHG Emissions Associated with Naphtha and LPG Produced from Canola Oil Through a Hydrotreating Process (in grams of CO_2 equivalent per MJ)

	Naphtha	**LPG**
Lifecycle GHG Emissions	28.7 to 33.9	28.7 to 33.9
Percent Reduction Relative to Baseline	64% to 69%	63% to 69%

We do not present separate results of heating oil as it is not reported as an output for any of the hydrotreating processes evaluated. However, renewable diesel could be used as heating oil if market conditions change substantially. The GHG emissions associated with heating oil are therefore very similar to renewable diesel, although there may be small differences in GHG emissions associated with fuel distribution and use.

As discussed above, canola oil hydrotreating processes that are set up to maximize jet fuel output require more processing and hydrogen, resulting in greater lifecycle GHG emissions. For example, our lifecycle GHG estimates using hydrotreating input-output data from GREET-2021 are 31.0 gCO_2e/MJ for renewable diesel and 38.2 gCO_2e/MJ for renewable jet fuel, and our estimates based on hydrotreating data from Pearlson et al. (2013) are 29.5 gCO_2e/MJ for renewable diesel and 30.5 gCO_2e/MJ for renewable jet fuel. The range of lifecycle GHG estimates for canola oil renewable jet fuel are reported in Table II.C.12-3.

Table II.C.12-3 – Lifecycle GHG Emissions Associated with Renewable Jet Fuel Produced from Canola Oil Through a Hydrotreating Process (in grams of CO_2 equivalent per MJ)

Emissions Category	2005 Diesel Baseline	Canola Oil Renewable Jet Fuel		
Domestic Agriculture	18	-2.4 to -2.2		
International Agriculture		-0.31 to -0.28		
Feedstock Transport & Crushing		6.3 to 7.0		
Fuel Production		12.7 to 20.7		
Downstream & Use	75	0.5		
Land Use Change Estimate		Mean	Low	High
Land Use Change (LUC)		13.2 to 14.5	3.0 to 3.3	24.9 to 27.5
Net Emissions	93	30.5 to 38.2	20.2 to 28	42.2 to 49.9
% GHG Reduction Relative to Baseline		59% to 67%	70% to 78%	46% to 54%

III. Consideration of Lifecycle Analysis Results

We evaluated the lifecycle GHG emission associated with renewable diesel, jet fuel, naphtha and LPG produced from canola oil through a hydrotreating process. The purpose of this analysis was to determine whether these fuel pathways satisfy the statutory 50 percent GHG reduction threshold under the RFS program for advanced biofuel and biomass-based diesel. Our approach to considering the lifecycle GHG estimates for purposes of threshold determinations is consistent with the "weight of evidence" approach that we used for the March 2010 RFS2 rule. In the preamble to the March 2010 RFS2 rule we said, "because of the inherent uncertainty and the state of the evolving science on this issue, EPA is basing its GHG threshold compliance determinations for this rule on an approach that considers the weight of evidence currently available." 75 FR 14785. In this section we consider the weight of the evidence and propose to make threshold determinations on this basis.

Based on the range of lifecycle GHG emissions estimates presented above, the weight of available evidence, and our technical judgments, we propose to find that all the pathways evaluated would meet the 50 percent GHG reduction threshold required for advanced biofuel and biomass-based diesel. Our evaluation considers variability in hydrotreating processes and uncertainty in land use change emissions.

When we consider the mean land use change GHG estimates, the entire range of GHG reduction results exceeds the 50 percent GHG reduction requirement for all of the pathways evaluated. When we consider the high-end of the 95-percent confidence interval for international land use change GHG emissions and the hydrotreating process data with the highest GHG emissions, all the pathways evaluated except for jet fuel still exceed the 50 percent GHG reduction threshold. Thus, based on the range of estimated GHG reduction results and the weight of available evidence, we judge that there is a reasonable basis to be confident that the 50% GHG reduction threshold will be achieved for renewable diesel, naphtha and LPG produced from canola oil through a hydrotreating process.

When we consider the high-end of the 95-percent confidence interval for international land use change GHG emissions and the hydrotreating process data with the highest GHG emissions, we estimate that jet fuel produced from canola oil results in a 46 percent reduction relative to the petroleum baseline. That is, the entire range of lifecycle GHG estimates for jet fuel does not exceed the 50 percent threshold. We follow the approach taken in the March 2010 RFS2 rule for considering such information for purposes of proposing a threshold determination for jet fuel produced from canola oil. In that rule we said, “In making the threshold determinations for this rule, EPA weighed all of the evidence available to it, while placing the greatest weight on the best estimate value for the base yield scenario. In those cases where the best estimate for the potentially conservative base yield scenario exceeds the reduction threshold, EPA judges that there is a good basis to be confident that the threshold will be achieved and is determining that the bio-fuel pathway complies with the applicable threshold. To the extent the midpoint of the scenarios analyzed lies further above a threshold for a particular biofuel pathway, we have increasingly greater confidence that the biofuel exceeds the threshold." 75 FR 14785.

When we consider our mean estimates of international land use change GHG emissions, the estimated range of GHG reductions for canola oil-based jet fuel produced through hydrotreating is a 59% to 67% GHG reduction relative to the petroleum baseline. Given that this range, which is already based on reasonably conservative assumptions, exceeds the 50% GHG reduction threshold, and considering the weight of evidence across all the available results, we judge that there is a reasonable basis to be confident that the 50% GHG reduction threshold will be achieved for canola oil jet fuel produced through a hydrotreating process.

Based on the evaluation and results described above, we propose to add "Canola/Rapeseed oil" to the Feedstock columns in rows G and I of table 1 to 40 CFR 80.1426. This addition to row G would make renewable diesel, jet fuel, and heating oil produced through a hydrotreating process eligible for biomass-based diesel (D-code 4) RINs if the hydrotreating process does not co-process renewable biomass and petroleum. This addition to row I would make naphtha and LPG produced from canola oil through a hydrotreating process eligible for advanced biofuel (D-code 5) RINs. The RFS regulatory definition of biomass-based diesel at 40 CFR 80.1401 excludes naphtha and LPG.

The GHG estimates reported in Section II.C.12 of this preamble are based on our evaluation of standalone hydrotreating processes that process only vegetable oil. While there is substantial hydrotreating capacity at refineries that is potentially suitable for co-processing canola oil or other vegetable oils with petroleum, there is currently relatively little production or detailed input-output data for co-processing vegetable oil and petroleum in hydrotreating units.[73] For example, a co-processing module was added to

[73] Freeman, C. J., et al. (2013). Initial assessment of US refineries for purposes of potential bio-based oil insertions, Pacific Northwest National Lab. (PNNL), Richland, WA; van Dyk, S., et al. (2019). "Potential

GREET for the first time with the release of GREET-2021, but it currently contains "placeholder parametric assumptions" that Argonne National Laboratory is planning to replace after additional research.[74] The information that is available suggests that co-processing vegetable oil in hydrotreating units will require relatively minor adjustments compared to hydrotreating units that do not co-process with petroleum. There are also very few lifecycle GHG estimates of this process in peer-reviewed journals. The one study we found in the literature evaluated a hydrotreating unit of a Colombian refinery with four different feed rates of soybean oil (8.1 to 12.5 percent by mass) and reported similar input-output ratios as the standalone processes evaluated above in terms of hydrogen input, natural gas input, and fuel outputs per pound of feed.[75] Given that the large majority of our GHG reduction estimates significantly exceed the 50 percent reduction threshold for biofuels produced from canola oil hydrotreated without co-processing (see Section II.C.12 of this preamble), we believe our estimates support a finding that canola oil-based fuels from hydrotreating processes that co-process canola oil with petroleum also meet the 50 percent threshold. Thus, we propose to add "Canola/Rapeseed oil to the feedstock column of row H in table 1 to 40 CFR 80.1426, which would make, if finalized, renewable diesel, jet fuel, naphtha, LPG and heating oil produced from canola oil through a hydrotreating process that includes co-processing with petroleum eligible for advanced biofuel (D-code 5) RINs. Note that based on the definition of biomass-based diesel at CAA 211(o), fuels produced through co-processing renewable biomass and petroleum do not qualify as biomass-based diesel, but these fuels may qualify as advanced biofuels if they meet the GHG reduction and other statutory requirements. We request data and information on producing renewable fuel through

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synergies of drop-in biofuel production with further co-processing at oil refineries." Biofuels, Bioproducts and Biorefining 13(3): 760-775; Bezergianni, S., et al. (2018). "Refinery co-processing of renewable feeds." Progress in Energy and Combustion Science 68: 29-64.

[74] ANL (2021). Summary of Expansions and Updates in GREET 2021, Energy Systems Division: 58.

[75] Garraín, D., et al. (2014). "Well-to-Tank environmental analysis of a renewable diesel fuel from vegetable oil through co-processing in a hydrotreatment unit." Biomass and Bioenergy 63: 239-249.

hydrotreating processes that co-process canola oil and petroleum. We request comments on our proposal to make these co-processed fuels eligible for advanced biofuel (D-code 5) RINs.

IV. Summary

Based on our GHG lifecycle evaluation described above, we propose to find that renewable diesel, jet fuel, naphtha, LPG, and heating oil produced from canola oil via a hydrotreating process meet the 50 percent GHG reduction threshold. This finding would support a determination that renewable diesel, jet fuel and heating oil produced from canola oil are eligible for biomass-based diesel (D-code 4) RINs if they are produced through a hydrotreating process that does not co-process renewable biomass and petroleum, and for advanced biofuel (D-code 5) RINs if they are produced through a process that does co-process renewable biomass and petroleum. This finding would also support a determination that naphtha and LPG production from canola oil through a hydrotreating process are eligible for advanced biofuel (D-code 5) RINs. EPA requests comment on these proposed pathways.

V. Statutory & Executive Order Reviews

Additional information about these statutes and Executive Orders can be found at *https://www.epa.gov/laws-regulations/laws-and-executive-orders*.

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This proposed action is a significant regulatory action that was submitted to the Office of Management and Budget (OMB) for review. Any changes made in response to OMB recommendations have been documented in the docket. The GHG lifecycle analysis conducted for this proposed determination, "Renewable Fuel Standard Program: Canola Oil Pathways to Renewable Diesel, Jet Fuel, Naphtha, Liquefied Petroleum Gas and Heating Oil," is available in the docket.

B. Paperwork Reduction Act (PRA)

This proposed action would not impose any new information collection burden under the PRA. OMB has previously approved the information collection activities contained in the existing regulations and has assigned OMB control number 2060-0725. This proposed action would create new pathways by which to generate RINs for renewable fuels under the RFS program but creates no new information collection requirements for these additional pathways.

C. Regulatory Flexibility Act (RFA)

I certify that this proposed action would not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, EPA concludes that the impact of concern for this proposed rule is any significant adverse economic impact on small entities and that the agency is certifying that this proposed rule would not have a significant economic impact on a substantial number of small entities if the proposed rule would have no net burden. This proposed rule would enable canola oil producers and producers of biofuels from canola oil to participate in the RFS program, see CAA section 211(o), if they choose to do so to obtain economic benefits. We have therefore concluded that this proposed action would have no net regulatory burden for all directly regulated small entities.

D. Unfunded Mandates Reform Act (UMRA)

This proposed action does not contain an unfunded mandate of $100 million or more as described in UMRA, 2 U.S.C. 1531–1538, and would not significantly or uniquely affect small governments. The proposed action would impose no enforceable duty on any state, local or tribal governments or the private sector.

E. Executive Order 13132: Federalism

This proposed action does not have federalism implications. It would not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

F. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

This proposed action does not have tribal implications as specified in Executive Order 13175. This proposed rule would affect only producers of canola oil and producers of biofuels made from canola oil. Thus, Executive Order 13175 does not apply to this proposed action.

G. Executive Order 13045: Protection of Children from Environmental Health and Safety Risks

The EPA interprets Executive Order 13045 as applying only to those regulatory actions that concern environmental health or safety risks that the EPA has reason to believe may disproportionately affect children, per the definition of “covered regulatory action” in section 2-202 of the Executive order. This proposed action is not subject to Executive Order 13045 because it does not concern an environmental health risk or safety risk.

H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

This proposed action is not a “significant energy action” because it is not likely to have a significant adverse effect on the supply, distribution or use of energy. This proposed rule would enable canola oil producers and producers of biofuels from canola oil to participate in the RFS program, see CAA section 211(o), if they choose to do so. This may create additional supplies of energy, potentially leading to positive impacts on the energy system. This proposed rule would create no new burdens on the distribution or use of energy.

I. National Technology Transfer and Advancement Act (NTTAA)

This rulemaking does not involve technical standards.

J. Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

The EPA believes that this proposed action is not subject to Executive Order 12898 (59 FR 7629, February 16, 1994) because it does not establish an environmental health or safety standard. This proposed rule would give renewable fuel producers the ability to generate credits under the RFS program for the production of specified biofuels from canola oil. This proposed rule does not affect the level of protection provided to human health or the environment by applicable air quality standards. Future actions to set biofuel volume requirements may take into consideration the availability of this renewable fuel pathway for the production of biofuel from canola oil and thus may affect GHG emissions, air quality, water or soil quality, or fuel and food prices.[76] However, this proposed action does not modify biofuel volume requirements and thus the EPA believes that the proposed rule to approve a new pathway, in and of itself, will not affect human health or the environment.

VI. Statutory Authority

Statutory authority for this action comes from CAA sections 114, 208, 211, and 301.

List of Subjects in 40 CFR Part 80

Environmental protection, Administrative practice and procedure, Air pollution control, Diesel fuel, Fuel additives, Gasoline, Imports, Oil imports, Petroleum, Renewable fuel.

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[76] For a recent discussion of such potential impacts, see Chapter 8 of the Draft Regulatory Impact Analysis for the RFS "Proposed Volume Standards for 2020, 2021, and 2022". EPA-HQ-OAR-2021-0324.

Michael S. Regan,

Administrator.

For the reasons set forth in the preamble, the EPA proposes to amend 40 CFR part 80 as follows:

PART 80—REGULATION OF FUELS AND FUEL ADDITIVES

1. The authority citation for part 80 continues to read as follows:

Authority: 42 U.S.C. 7414, 7521, 7542, 7545, and 7601(a).

Subpart M—Renewable Fuel Standard

2. Amend §80.1401 by adding in alphabetical order the definition of "Canola/rapeseed oil" to read as follows:

§80.1401 Definitions.

* * * * *

Canola/Rapeseed oil means either of the following:

(1) *Canola oil* is oil from the plants *Brassica napus, Brassica rapa, Brassica juncea, Sinapis alba, or Sinapis arvensis* which typically contains less than 2 percent erucic acid in the component fatty acids obtained.

(2) *Rapeseed oil* is the oil obtained from the plants *Brassica napus, Brassica rapa*, or *Brassica juncea*.

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3. Amend §80.1426 by:

a. Removing the text "Table 1 to this section" wherever it appears and adding, in its place, the text "table 1 to paragraph (f)(1) of this section";

b. Removing the text "Table 1 to § 80.1426" wherever it appears and adding, in its place, the text "table 1 to paragraph (f)(1) of this section";

c. In paragraph (f)(1), removing the text "Tables 1 and 2 to this section" and adding in its place the text "tables 1 and 2 to this paragraph (f)(1)";

d. Redesignating table 1 to § 80.1426 as table 1 to § 80.1426(f)(1);

e. In newly redesignated table 1 to §80.1426(f)(1), revising the entries "G," "H," and "I";

f. Redesignating table 2 to § 80.1426 as table 2 to § 80.1426(f)(1).

The revisions read as follows:

§80.1426 How are RINs generated and assigned to batches of renewable fuel?

* * * * *

(f) * * *

(1) * * *

Table 1 to § 80.1426(f)(1)—Applicable D Codes for Each Fuel Pathway for Use in Generating RINs

	Fuel type	Feedstock	Production process requirements	D-Code
* * * * * * *				
G	Biodiesel, renewable diesel, jet fuel, and heating oil	Canola/Rapeseed oil	One of the following: Transesterification with or without esterification pre-treatment, or Hydrotreating; excludes processes that co-process renewable biomass and petroleum	4
H	Biodiesel, renewable diesel, jet fuel, and heating oil.	Soy bean oil; Oil from annual covercrops; Oil from algae grown photosynthetically; Biogenic waste oils/fats/greases; Non-food grade corn oil; *Camelina sativa* oil; Distillers sorghum oil; Canola/Rapeseed oil	One of the following: Transesterification with or without esterification pre-treatment, or Hydrotreating; includes only processes that co-process renewable biomass and petroleum	5
I	Naphtha, LPG	*Camelina sativa* oil; Distillers sorghum oil; Canola/Rapeseed oil	Hydrotreating	5
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[FR Doc. 2022-07598 Filed: 4/15/2022 8:45 am; Publication Date: 4/18/2022]